

BI Pulls – For Portfolio Manager Property Type Fact Sheets

1. Data Elements to Pull

Ownership and Identification	Whole Building Data	Space Data
<ul style="list-style-type: none">• Building ID• Name• Building Type• City• State• Administrator Full Name• Owner• Organization• BDA Email• Current Period Ending Date• Baseline Period Ending Date• Date Updated• Building Certified (Y/N)<ul style="list-style-type: none">○ Years Certified• Year Built	<ul style="list-style-type: none">• Total Floor Area• Current Score• Current Site Energy• Current Source Energy• Current Weather Normalized Source Energy• Current GHG Emissions• Baseline Score• Baseline Site Energy• Baseline Source Energy• Baseline Weather Normalized Site Energy• Baseline GHG Emissions• HDD• CDD• Predicted Source EUI	<ul style="list-style-type: none">• Space Type of Interest<ul style="list-style-type: none">○ ALL attributes• Parking<ul style="list-style-type: none">○ ALL attributes• All Other Space Types<ul style="list-style-type: none">○ Floor Area

2. Filters to Apply

- a. Filter for Current Period Ending Date
- b. Filter for Desired Building Type

Timeline - Fact Sheets

Alexandra Sullivan to: Lauren Pitcher

08/16/2012 06:41 PM

Hi Lauren,

My ICF team is moving along on the graphics. We are meeting on Wednesday at 1pm with Bill and Sudhir (a regular meeting), to look at some of their ideas and make some suggestions. You're more than welcome to attend, but I know you're super busy, so that is up to you.


In the mean time, Jean has also asked for us to try to complete one as a prototype for review by her and Beth by the end of this month (eek!). I wanted to ask if you think your team will have a template available for us to work off of by next week? I think we might need that to make sure we can fit our content in and to finalize our first sheet for review by the end of the following week.

Thanks!

Alexandra Sullivan

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sullivan.alexandra@epa.gov



Re: For our 10:30 
Alexandra Sullivan to: Lisauskas, Sara

08/23/2012 01:50 PM

Sara,

Based on our meeting, I created the attached schedule.

Thanks!

Alexandra Sullivan

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Schedule.docx

Alexandra Sullivan Sara, I forgot to email you yesterday with an up... 08/23/2012 08:39:38 AM

From: Alexandra Sullivan/DC/USEPA/US
To: "Lisauskas, Sara" <Sara.Lisauskas@icfi.com>
Date: 08/23/2012 08:39 AM
Subject: For our 10:30

Sara,

I forgot to email you yesterday with an update! But, here is some important information for us to consider at our 10:30.

1. Budget

Either today or tomorrow, I will put through the paperwork to fully fund your TO at the current ceiling (e.g. another 75,000). Down the line, it is reasonable for us to plan for an additional \$20,000 to cover the added work we did for NRCAN, and another \$15,000 for our general work. Jean really wants all of these publications out this fall, so my hypothesis is that if that takes more funds than we thought, we may be able to increase the ceiling a little more to cover the research and documentation associated with the upgrade and other tasks, but we can't count on that for sure, yet.

2. Priorities

Here is the list of items we want to create within the "fact sheet" series in basic order of priority:

Benchmarking & Savings
Office
Benchmarking Overall
Retail

School
Water Benchmarking
Hotel
Bank
Warehouse
Hospital
Worship
Court
Other Property Types

The absolute priority for the Partner meeting is the first 6 items (The 3 general ones and 3 space specific). The water is the least important of those 6, but still something Jean wants to get out. If we are able to, it would be great to have more of the space types, too. This may end up being pretty straightforward, since we've done the groundwork. It depends on the process of populating the final template, etc.

3. Schedule

When we talk I would like to develop a strategy for our schedule. I am unfortunately going to be in Tokyo for work the week of 10/1. Therefore, my goal is to have the 6 must-have complete the by 9/28. If we are able to format and finalize two more space-specific documents while I'm out, that would be great. That gives us about 5 more weeks.

A starting schedule I am proposing is as follows:

9/14 - Complete Office, Retail, General Benchmarking
9/19 - Complete Savings
9/26 - Complete Water
9/28 - Complete School
10/5 - Complete Hotel and Bank

I'm not wedded to this schedule. So, we should discuss. I also think we should institute one or two more times to meet each week as "standard" because I don't think that the Wednesday at 1pm slot alone will be sufficient. My schedule is somewhat flexible except we have our updates on the PM Webinar on 9/12 and 9/20, and we have our webinar releasing web services on 9/25. Other than those afternoons, I should be able to move meetings to accommodate this work.

Talk to you in just a couple of hours,

Alexandra Sullivan

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Fact Sheet – Schedule

Week	Goals/Activities
8/27 – 8/31	<ul style="list-style-type: none"> • Savings: Create graphs & generate ideas • General: Create graphs & generate ideas • Office: Prepare full sample with draft 1 layout from Crosby • Water: None • Retail/K12: None (work on graphs, time allowing)
9/3 – 9/7	<ul style="list-style-type: none"> • Savings: Mock-up desired content & share with graphics team • General: Mock-up desired content & share with graphics team • Office: Send Office to Jean and Beth for Review, 9/4 • Water: Create graphs & generate ideas • Retail/K12: None (work on graphs, time allowing)
9/10 – 9/14	<ul style="list-style-type: none"> • Savings: Review graphics ideas and modify/tweak <ul style="list-style-type: none"> ◦ Send to Jean/Beth to review • General: Review graphics ideas and modify/tweak • Office: Incorporate suggestions from Jean & Beth • Water: Mock-up desired content & share with graphics team • Retail/K12: None (work on graphs, based on layout and Jean review of Office)
9/17 – 9/21	<ul style="list-style-type: none"> • Savings: Finalize with approved Template • General: Finalize with approved Template • Office: Finalize with approved Template • Water: Review graphics ideas and modify/tweak <ul style="list-style-type: none"> ◦ Send to Jean/Beth to review • Retail/K12: Begin to finalize graphs
9/24 – 9/28	<ul style="list-style-type: none"> • Water: Finalize with approved Template • Retail: Finalize with approved Template
10/1 – 10/5	<ul style="list-style-type: none"> • Work to finalize Hotel and Bank. If time allows, expand to Warehouse and Hospital. (Alexandra working from Tokyo) • Everything planned for partner meeting is final and printed.
10/8 – 12/12	<ul style="list-style-type: none"> • Partner Meeting

Property Type	Average Score
K-12 School	63.6
Office	61.7
Retail	61.0
Supermarket	60.6
Courthouse	60.5
Hospital	55.3
Warehouse	52.5
Hotel	48.6
House of Worship	47.8
Bank	42.8

Re: PM Fact Sheets - Bank, Courthouse, Supermarket, and Warehouse

Alexandra Sullivan to: Lisauskas, Sara

08/23/2012 09:47 AM

Cc: Bill Vonneida, "debra_connella@sra.com", "Elliott, Douglas", "Kent, Justin
(Justin_Kent@sra.com)", "Giuliano, Meg", "Greenburg, Seth", Sudhir Paladugu

Sara,

Thanks for the continued great work on this analysis!

My comments and suggestions are as follows:

1. Progress & Next Steps - At this time, let's not begin analysis on any other property types. We should focus our efforts on the 3 general documents (Benchmarking, Savings, Water), and not on more space types for now.

Redacted - Ex. 5

Thanks,

Alexandra Sullivan

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"Lisauskas, Sara"

Alexandra, Over the past two weeks, we worked...

08/20/2012 03:37:52 PM

From:

"Lisauskas, Sara" <Sara.Lisauskas@icfi.com>

To:

Alexandra Sullivan/DC/USEPA/US@EPA, Sudhir Paladugu/DC/USEPA/US@EPA, Bill

Cc: Vonneida/DC/USEPA/US@EPA
"Greenburg, Seth" <Seth.Greenburg@icfi.com>, "Giuliano, Meg" <Meg.Giuliano@icfi.com>,
"Elliott, Douglas" <Douglas.Elliott@icfi.com>, "Kent, Justin (Justin_Kent@sra.com)"
<Justin_Kent@sra.com>, "debra_connella@sra.com" <debra_connella@sra.com>
Date: 08/20/2012 03:37 PM
Subject: PM Fact Sheets - Bank, Courthouse, Supermarket, and Warehouse

Alexandra,

Over the past two weeks, we worked on graphs for four new space types. The status of our analysis is as follows:

- 6 space types completed to date: hospital, school, office, worship, hotel, retail
- 4 space types being reviewed this week: bank, courthouse, supermarket, and warehouse
- 5 space types remaining: senior care, medical office, residence hall, data center, wastewater treatment plant

Per our discussions last week, we can decide if we want to hold on analysis or keep going with the remaining space types.

The analysis files for the four space types will be sent over the FTP site. We decided to skip the Publisher files and just work with the spreadsheets this week, in the interest of time and budget. Listed below are the filters unique to each space type, the recommended scatter plots, and a few issues we wanted to flag for discussion.

Bank

- Filters:
 - Square footage: $1,000 \leq x \leq 5,000,000$
 - Worker Density: $0.00001 \leq x \leq 20$
 - PC Density: $0.00001 \leq x \leq 20$
 - Operating Hours $30 \leq x \leq 168$
- Recommended scatter plots: Worker Density, PC Density, CDD

Redacted - Ex. 5

Courthouses

- Filters
 - Worker Density: $0.00001 \leq x \leq 20$
 - PC Density: $0.00001 \leq x \leq 20$
 - Work Hours $30 \leq x \leq 168$
- Recommended scatter plots: Operating Hours, Worker Density, CDD (same as offices)

Supermarkets

- Filters
 - Worker Density: $0.00001 \leq x \leq 5$
 - PC Density: $0.00001 \leq x \leq 20$
 - Operating Hours $30 \leq x \leq 168$
 - Custom filter: "HDD", "CDD", or "123 advantage" in the Address field
 - There are a couple thousand supermarkets with "456" as the owner and "123 Advantage Highway" as the address that mostly score 90+ and skew the score distribution high. These seemed to be fake buildings and were filtered out of the data set.
 - EUI filter – We left the EUI filter at $5 \leq x \leq 2000$, but we considered changing the filter minimum from 5 kBtu/sqft. to 100 kBtu/sqft, since it seems unreasonable that a supermarket would have such a low EUI. A small cluster of supermarkets with EUI less than 100 kBtu/sqft shows up in the scatter plots.
- Recommended Scatter plots: Walk-in Refrigeration Density, Worker Density, CDD

Redacted - Ex. 5

Warehouses

- Filters
 - Worker Density: $0.00001 \leq x \leq 5$
 - Walk-in Density: $0 \leq x \leq 1$
 - Work Hours $30 \leq x \leq 168$
- Recommended Scatter plots: Worker Density, Operating Hours, HDD

Redacted - Ex. 5

Below is a proposed schedule for next steps.

- Review 4 new space types and designs for office figures on 8/22
- Receive template from communications team by 8/24?

- Review energy savings analysis with Cindy on 8/24
- Complete graphics and review final version of Office file on 8/29.
- Review final version of parent file on 9/5.
- EPA to provide comments on final Office file by 9/7
- Complete final versions of first 6 space types on 9/14
- Complete final versions of next 4 space types on 9/22
- Decide on plans to review last 5 space types (senior care, medical office, residence hall, data center, wastewater treatment plant)
- Goal: Have ready for Partner meeting on 10/10 & 10/11.

Thanks,

Sara

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ICF INTERNATIONAL | 100 Cambridgepark Drive, Cambridge, MA 02140 | 617.913.0564 (m)
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[attachment "Score vs EUI comparison.xlsx" deleted by Alexandra Sullivan/DC/USEPA/US]

Re: Data Trends for Hotels?

Alexandra Sullivan

to:

Andrea Schnitzer

09/27/2012 11:54 AM

Hide Details

From: Alexandra Sullivan/DC/USEPA/US

To: Andrea Schnitzer/DC/USEPA/US@EPA

1 Attachment



Image.1348761281598.jpg

Andy,

Unfortunately, this document isn't started.

We are only producing Office, Retail and K12 for the partner meeting. We will be doing the others later in the fall. So, we have a big excel on hotels, but nothing that is ready for sharing yet.

Sorry!

Alexandra Sullivan

U.S. EPA

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-----Andrea Schnitzer/DC/USEPA/US wrote: -----

To: Alexandra Sullivan/DC/USEPA/US@EPA

From: Andrea Schnitzer/DC/USEPA/US

Date: 09/27/2012 11:49AM

Subject: Data Trends for Hotels?

Hi Alexandra,

I have a few calls on Friday, one with an academic institution that would likely be interested to see our analysis of hotel PM data. Is this document complete, or is it a bit too early, still?

Andy

Andrea Schnitzer
National Program Manager
U.S. Environmental Protection Agency
ENERGY STAR Commercial & Industrial Buildings Branch
1310 L St. NW, Washington, DC 20005

p: 202.343.9064
e: schnitzer.andrea@epa.gov





DataTrends - Final documents for Energy, Water, Savings, and Office

Lisauskas, Sara

to:

Alexandra Sullivan, Cindy Jacobs, Sudhir Paladugu

10/02/2012 11:12 AM

Cc:

"Greenburg, Seth"

Hide Details

From: "Lisauskas, Sara" <Sara.Lisauskas@icfi.com>

To: Alexandra Sullivan/DC/USEPA/US@EPA, Cindy Jacobs/DC/USEPA/US@EPA, Sudhir Paladugu/DC/USEPA/US@EPA

Cc: "Greenburg, Seth" <Seth.Greenburg@icfi.com>

History: This message has been replied to and forwarded.

8 Attachments



DataTrends_Savings_20121002.pub



DataTrends_Savings_20121002.pdf



DataTrends_Energy_20121002.pub



DataTrends_Energy_20121002.pdf



DataTrends_Water_20121002.pub



DataTrends_Water_20121002.pdf



DataTrends_Office_20121002.pub



DataTrends_Office_20121002.pdf

All,

Attached are final version of the Energy, Water, Savings, and Office documents. The pdf versions are ready for Sudhir to print.

The following changes were made to the pdf files that were sent yesterday morning:

- General and Savings - Revised to incorporate Cindy's minor comments

- All - Icons were updated to versions with better resolution
- Water – Updated the EUI distributions with the operating characteristics to include a label on the Y-axis, and to move some of the median lines so that they were in the right place.
- Savings – Changed the % labels to include no decimal points

Thanks,

Sara

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Fw: Hotel Data Trends can be posted
Alexandra Sullivan to: Lisauskas, Sara
Cc: "Greenburg, Seth"

10/31/2012 10:57 AM

Sara,

We do have sign-off from Jean and Beth, which leaves only Cindy's comment (which I think is something we cannot really address anyway). Let's confirm at our meeting at 12:30, but I think we can call these final.

Thanks,

Alexandra Sullivan

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sullivan.alexandra@epa.gov



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----- Forwarded by Alexandra Sullivan/DC/USEPA/US on 10/31/2012 10:56 AM -----

From: Jean Lupinacci/DC/USEPA/US
To: Alexandra Sullivan/DC/USEPA/US@EPA, Andrea Schnitzer/DC/USEPA/US@EPA, Sudhir Paladugu/DC/USEPA/US@EPA, Michael Zatz/DC/USEPA/US@EPA, Cindy Jacobs/DC/USEPA/US@EPA
Date: 10/31/2012 10:45 AM
Subject: Hotel Data Trends can be posted

Jean Lupinacci, Chief
ENERGY STAR Commercial and Industrial Branch
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www.energystar.gov



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RE: Fw: DataTrends - Hotel Document

Lisauskas, Sara to: Sudhir Paladugu, Alexandra Sullivan
Cc: Andrea Schnitzer, "Greenburg, Seth"

11/01/2012 10:03 AM

History: This message has been replied to.

2 attachments



DataTrends_Hotel_20121031.pdf DataTrends_Hotel_20121031.pub

Attached is revised version of the Hotel DataTrends.
This one should be final. Note that I used the same
filename as the version last night, with the October
date, since we were trying to get them all done in
October. So be careful not to mix them up.

Sara

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Remainder of thread redacted

Ex. 5

Budget Priorities

Alexandra Sullivan to: Lisauskas, Sara

11/01/2012 12:12 PM

Sara,

As you know, at this point the government has to plan for substantial budget cuts in FY2013. Unfortunately, as our management has assessed the best way to meet this lowered spending level, it appears the additional funding we discussed last month is not likely to be forthcoming. Rather, we will have to be working on a dramatically reduced budget for FY2013, at least for now.

I am still going to have to work through priorities with Mike and Jean and identify key projects. However, I am nervous about our ability to add funding to this task and therefore I want to ask you to stop working on the DataTrends series.

I realize this may come as a bit of a surprise. But, unfortunately this is the new direction we've just received from management. Our absolute priority has to be the finalization of weather information and the revision of our source energy factors, because these projects feed into the PM Upgrade. Once I have final budget direction from my management, we can re-assess together what part of the DataTrends can continue.

On the plus side, Canada is going to be starting work on their next model (Hospital) in January, and we are eager to work somewhat intensively as we did last summer. As you know, these funds are separate because they come from Canada. Therefore, we do anticipate more work in this area coming down the road shortly.

I'm tied up in meetings this afternoon and tomorrow morning, but if you want to call to discuss tomorrow afternoon, please feel free to do so.

Thank you,

Alexandra Sullivan

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Energy Use in Hotels

Hotels Using Portfolio Manager

 8,426 Properties

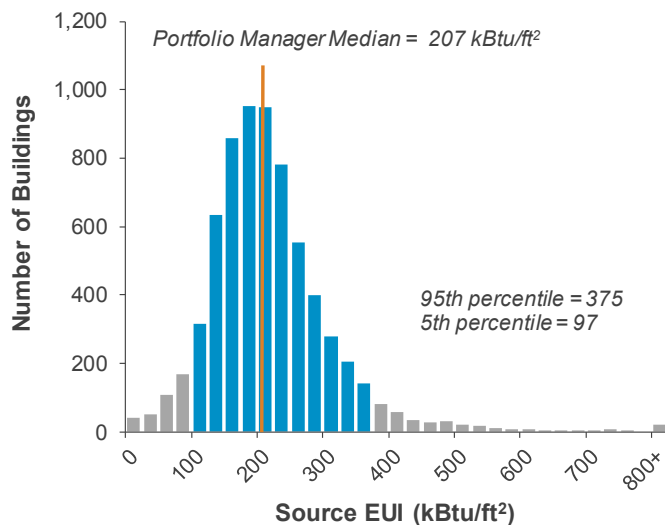
 1.7 Billion ft²

 49 Average
ENERGY STAR Score

The U.S. Environmental Protection Agency's (EPA) ENERGY STAR Portfolio Manager is changing the way organizations track and manage energy. Because of this widespread market adoption, EPA has prepared the DataTrends series to examine benchmarking and trends in energy and water consumption in Portfolio Manager. To learn more, visit www.energystar.gov/DataTrends.

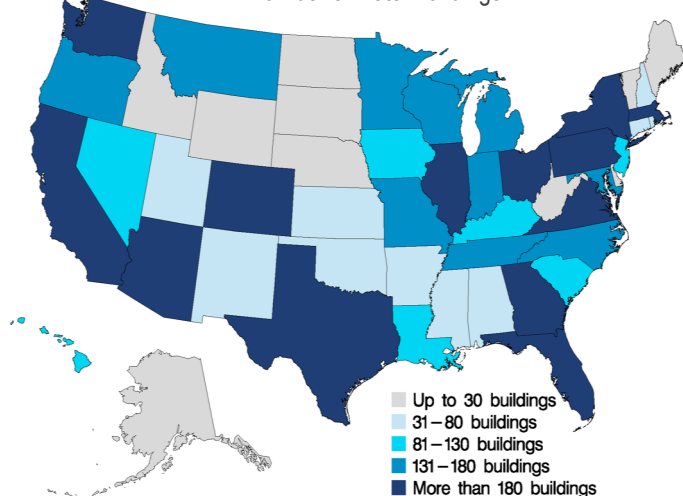
What is a typical operating profile?








Energy use intensity (EUI) ranges from less than 100 to more than 800 kBtu/ft² across all hotel buildings, with those at the 95th percentile using almost 4 times the energy of those at the 5th percentile. The distribution has a negative skew, which means the most energy intensive buildings are much further away from the median than the most efficient. Buildings may use more or less energy for many reasons, including variable equipment efficiency and energy management practices, as well as variations in climate and business activities.



The median hotel building in Portfolio Manager is 75,000 square feet and has about 1.8 rooms per thousand square feet. But the typical building use patterns observed in Portfolio Manager vary just as much as energy. As you can see, there are hotels of all shapes and sizes benchmarking in Portfolio Manager.

Benchmarking by State Number of Hotel Buildings

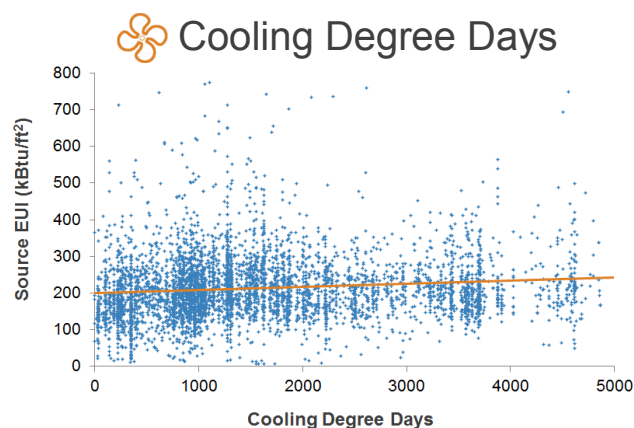
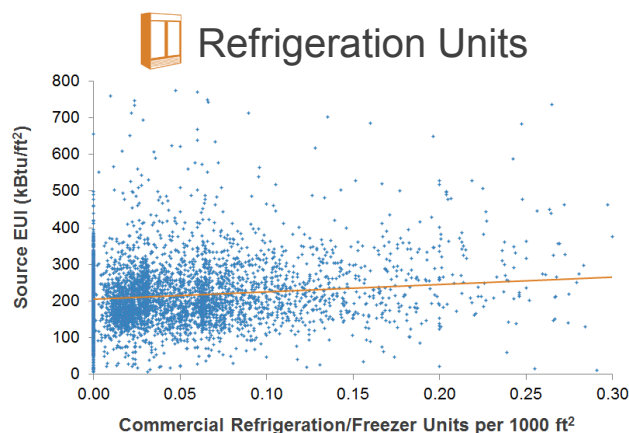
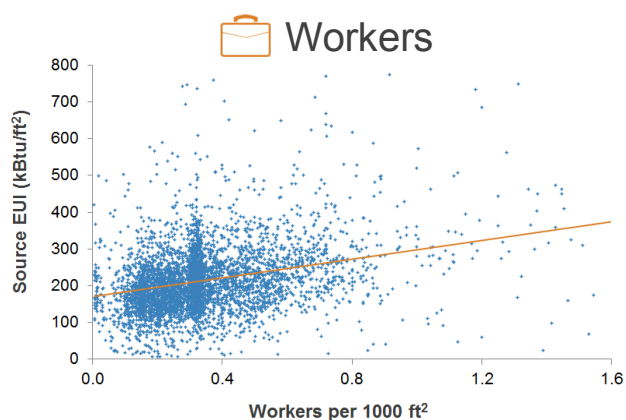


Building Characteristic	Range of Values		
	5th percentile	Median	95th percentile
 Square Feet	19,681	75,000	646,199
 Rooms per 1000 ft ²	0.78	1.77	3.72
 Workers per 1000 ft ²	0.13	0.32	0.72
 Commercial Refrigeration Units per 1000 ft ²	0.00	0.03	0.14
 Cooking?	--	51% say yes	--
 Heating Degree Days	387	3,427	6,699
 Cooling Degree Days	188	1,273	3,918

What is Source Energy? Source energy is the amount of raw fuel required to operate your building. In addition to what you use on-site, source energy includes losses from generation, transmission, and distribution of energy. Source energy enables the most complete and equitable energy assessment. Learn more at: www.energystar.gov/SourceEnergy.

What characteristics affect energy use?

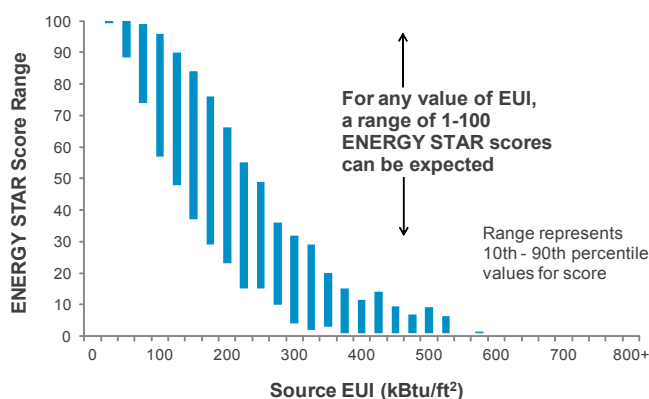
Business activity and climate are often correlated with energy consumption. For example, hotels that have more workers per square foot, more commercial refrigeration units per square foot, and/or experience more cooling degree days (CDD) use more energy, on average. The orange trend line in the graphs below is the steepest for workers, meaning that workers has a stronger effect on energy than CDD or refrigeration units. While these trends hold true on average, two buildings with the same number of workers could have very different energy, as shown by the range in the blue dots. Similar trends can be seen for other indicators of business activity, such as number of rooms.



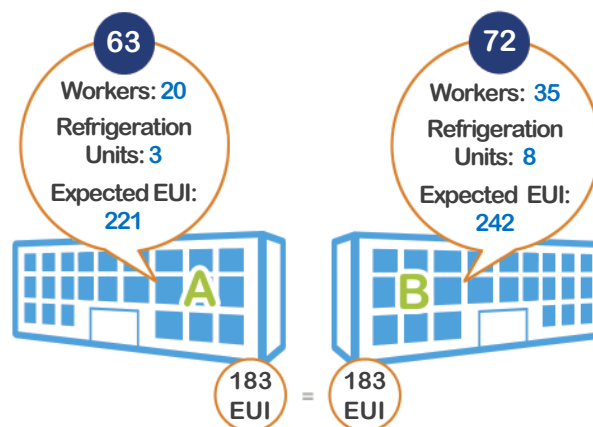
How does EPA's ENERGY STAR score vary with energy use?

EPA's ENERGY STAR score normalizes for the effects of operation. While buildings with lower EUI generally earn higher scores on the 1-100 scale, an individual building's result depends on its business activities. For any given EUI, a range of scores is possible.

ENERGY STAR Score Range



Let's look at two hotel buildings, Hotel A and Hotel B. They have the same EUI of 183 kBtu per square foot, and are identical except that Hotel B has more workers per square foot and more commercial refrigeration units per square foot. Because Hotel B has more intensive activities, it is expected to have a higher EUI than Hotel A, based on ENERGY STAR scoring models. Since Hotel B is *expected* to use more energy, but *actually* uses the same energy, it earns a higher score.



Note: Number and floor area of buildings benchmarked includes cumulative data through 2011. Analysis of energy use and business activity includes buildings benchmarked between 2006 and 2012. The data is self reported and has been filtered to exclude outliers, incomplete records, and test facilities. Portfolio Manager is not a randomly selected sample and is not the basis of the ENERGY STAR score. To learn more, visit: www.energystar.gov/DataTrends.

Energy Use in Hotels

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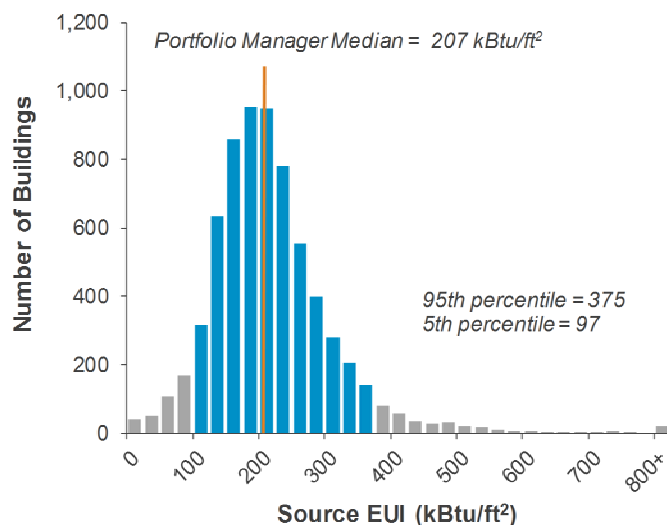
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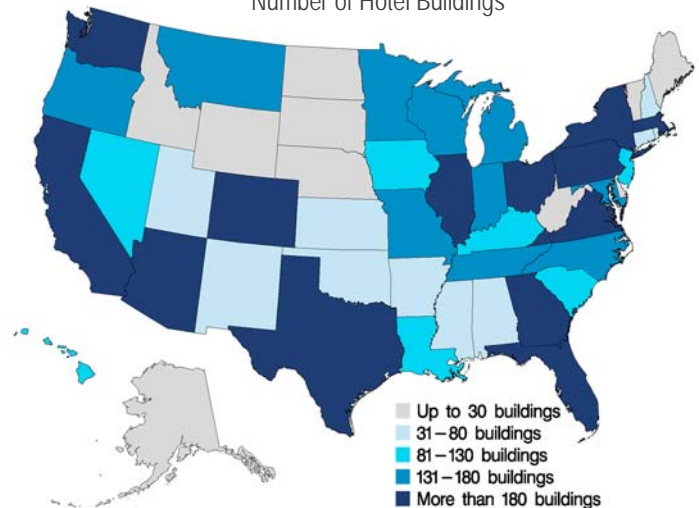
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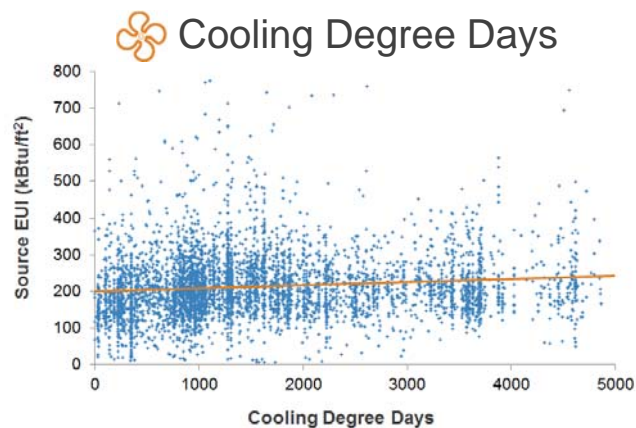
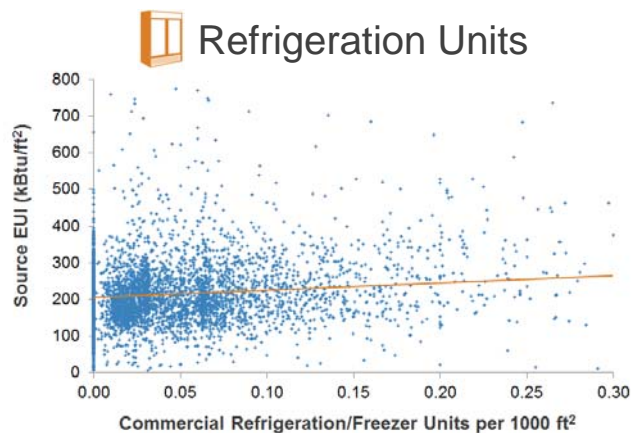
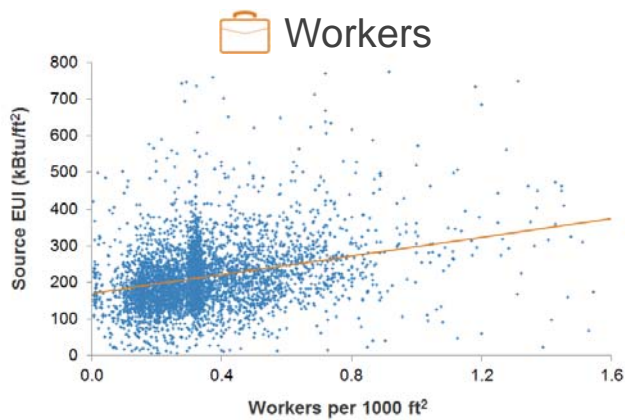


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What characteristics affect energy use?

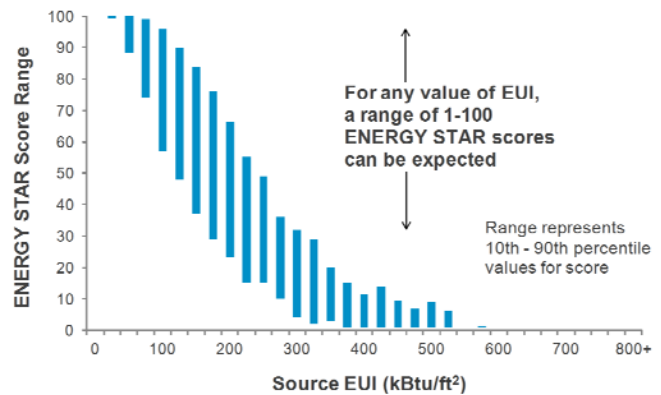
Business activity and climate are often correlated with energy consumption. For example, hotels that have more workers per square foot, more commercial refrigeration units per square foot, and/or experience more cooling degree days (CDD) use more energy, on average. The orange trend line in the graphs below is the steepest for workers, meaning that workers has a stronger effect on energy than CDD or refrigeration units. While these trends hold true on average, two buildings with the same number of workers could have very different energy, as shown by the range in the blue dots. Similar trends can be seen for other indicators of business activity, such as number of rooms.



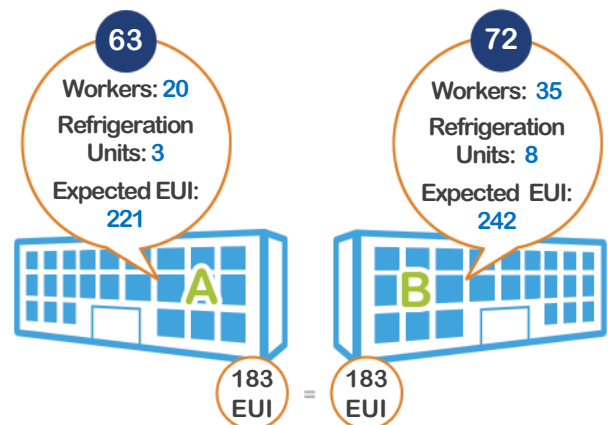
How does EPA's ENERGY STAR score vary with energy use?

EPA's ENERGY STAR score normalizes for the effects of operation. While buildings with lower EUI generally earn higher scores on the 1-100 scale, an individual building's result depends on its business activities. For any given EUI, a range of scores is possible.

ENERGY STAR Score Range



Let's look at two hotel buildings, Hotel A and Hotel B. They have the same EUI of 183 kBtu per square foot, and are identical except that Hotel B has more workers per square foot and more commercial refrigeration units per square foot. Because Hotel B has more intensive activities, it is expected to have a higher EUI than Hotel A, based on ENERGY STAR scoring models. Since Hotel B is *expected* to use more energy, but *actually* uses the same energy, it earns a higher score.



Note: Number and floor area of buildings benchmarked includes cumulative data through 2011. Analysis of energy use and business activity includes buildings benchmarked between 2006 and 2012. The data is self reported and has been filtered to exclude outliers, incomplete records, and test facilities. Portfolio Manager is not a randomly selected sample and is not the basis of the ENERGY STAR score. To learn more, visit: www.energystar.gov/DataTrends.

Energy Use in Office Buildings

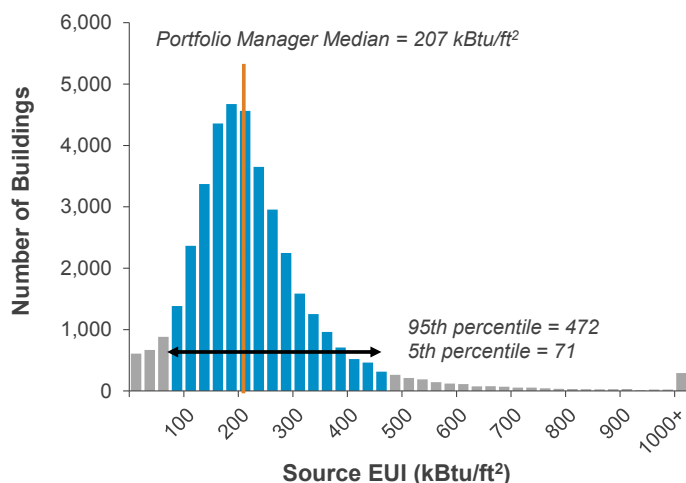
Office Buildings Using Portfolio Manager

-  57,247 Properties
-  9.5 Billion ft²
-  62 Average ENERGY STAR Score

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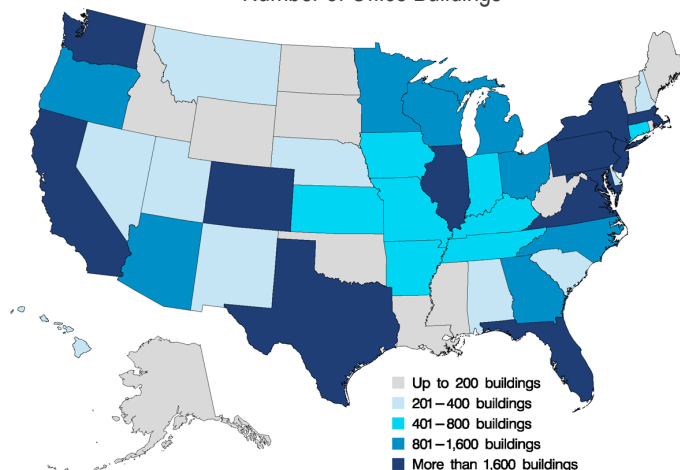
What is a typical operating profile?







Energy use intensity (EUI) ranges from less than 100 to more than 1,000 kBtu/ft² across all office buildings, with those at the 95th percentile using almost 7 times the energy of those at the 5th percentile. The distribution has a negative skew, which means the most energy intensive buildings are much further away from the median than the most efficient. Buildings may use more or less energy for many reasons, including variable equipment efficiency and energy management practices, as well as variations in climate and business activities.



The median office building in Portfolio Manager is approximately 70,000 square feet and operates 60 hours per week. But the typical building use patterns observed in Portfolio Manager vary just as much as energy. As you can see, there are offices of all shapes and sizes benchmarking in Portfolio Manager.

Benchmarking by State Number of Office Buildings

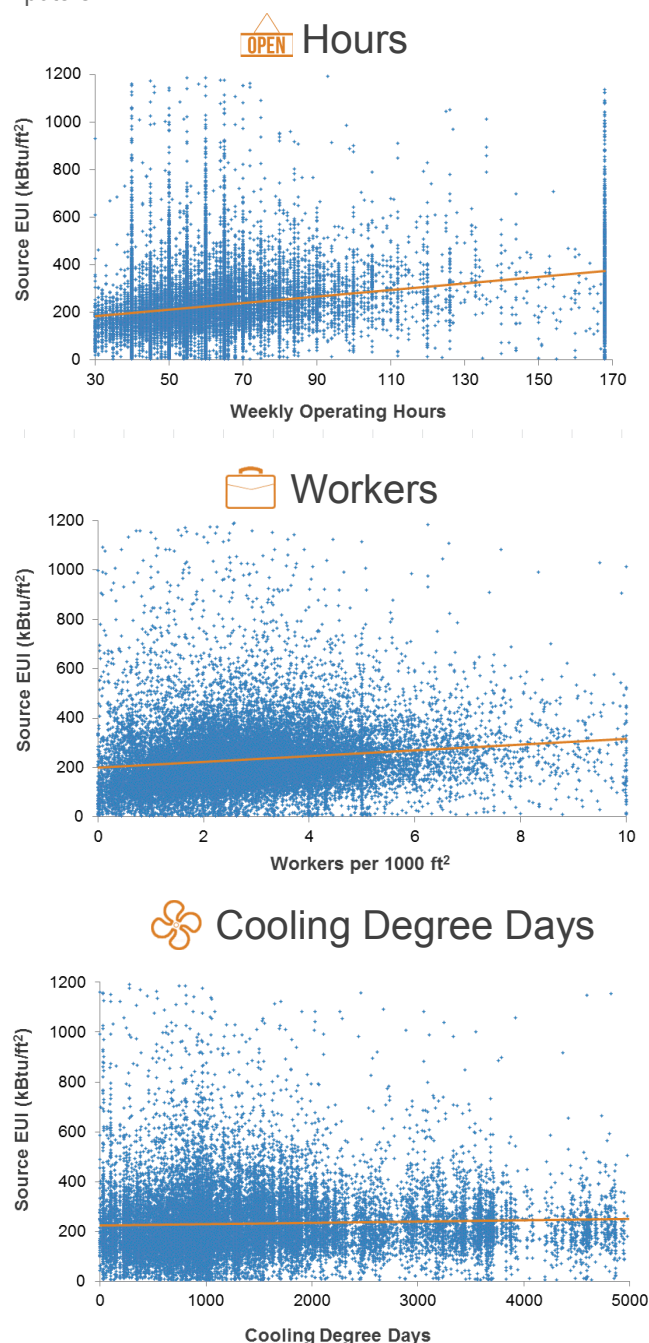


Range of Values			
Building Characteristic	5th percentile	Median	95th percentile
 Square Feet	7,215	69,635	549,681
 Operating Hours	40	60	120
 Workers per 1000 ft ²	0.7	2.4	5.6
 Computers per 1000 ft ²	0.6	2.5	6.5
 Heating Degree Days	965	4,221	6,799
 Cooling Degree Days	154	1,114	3,671

What is Source Energy? Source energy is the amount of raw fuel required to operate your building. In addition to what you use on-site, source energy includes losses from generation, transmission, and distribution of energy. Source energy enables the most complete and equitable energy assessment. Learn more at: www.energystar.gov/SourceEnergy.

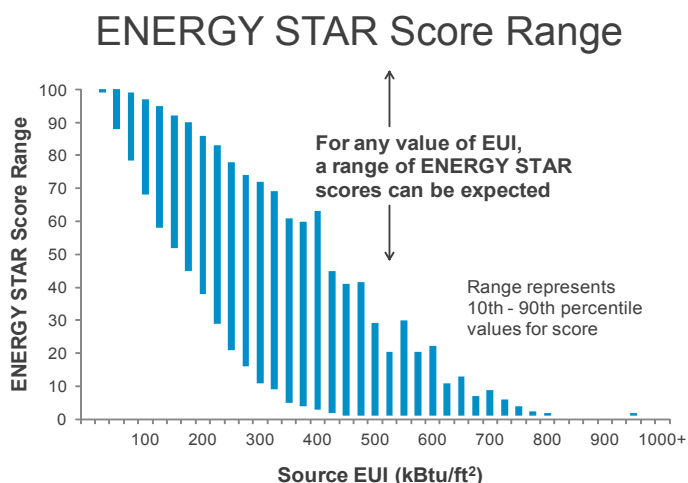
What characteristics affect energy use?

Business activity and climate are often correlated with energy consumption. For example, offices that are open longer hours, have more workers per square foot, and/or experience more cooling degree days (CDD) use more energy, on average. The orange trend line in the graphs below is the steepest for hours, meaning that hours has a stronger effect on energy than CDD or Workers. While these trends hold true on average, two buildings with the same hours could have very different energy, as shown by the range in the blue dots. Similar trends can be seen for other indicators of business activity, such as number of computers.

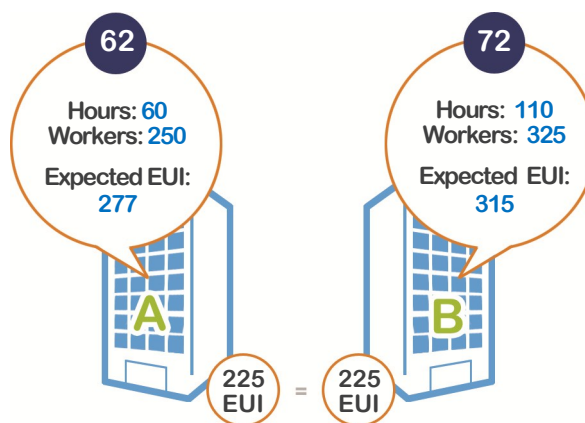


How does EPA's ENERGY STAR score vary with energy use?

EPA's ENERGY STAR score normalizes for the effects of operation. While buildings with lower EUI generally earn higher scores on the 1-100 scale, an individual building's result depends on its business activities. For any given EUI, a range of scores is possible.



Let's look at two office buildings, Office A and Office B. They have the same EUI of 225 kBtu per square foot, and are identical except that Office B is open longer hours and has more workers per square foot. Because Office B has more intensive activities, it is expected to have a higher EUI than Office A, based on ENERGY STAR scoring models. Since Office B is *expected* to use more energy, but *actually* uses the same energy, it earns a higher score.



Note: Number and floor area of buildings benchmarked includes cumulative data through 2011. Analysis of energy use and business activity includes buildings benchmarked between 2006 and 2012. The data is self reported and has been filtered to exclude outliers, incomplete records, and test facilities. Portfolio Manager is not a randomly selected sample and is not the basis of the ENERGY STAR score. To learn more, visit: www.energystar.gov/DataTrends.

Energy Use in Office Buildings

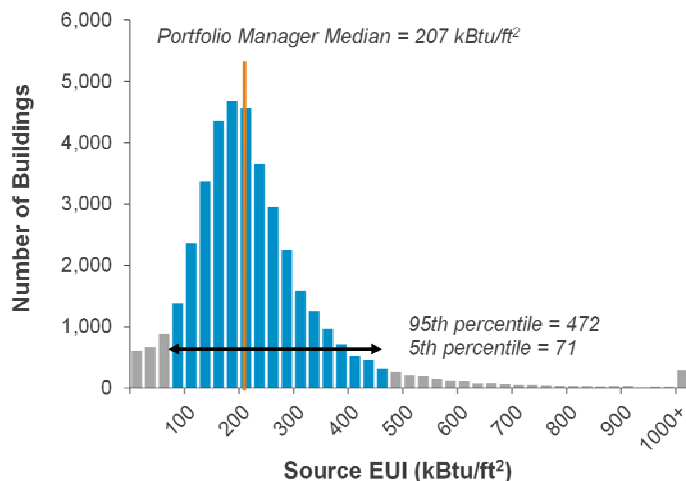
Office Buildings Using Portfolio Manager



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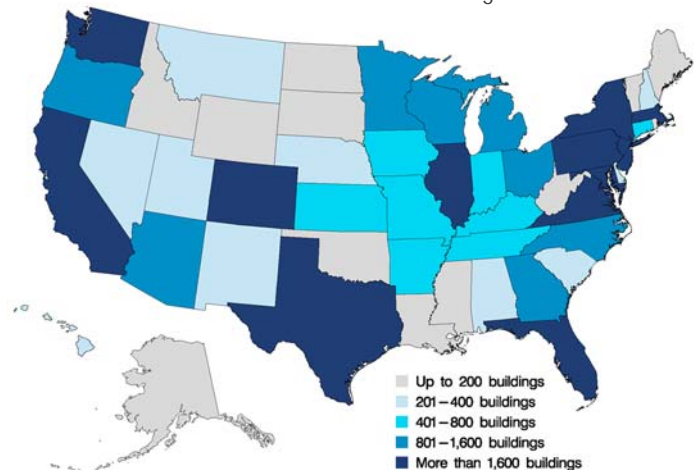
What is a typical operating profile?

Energy use intensity (EUI) ranges from less than 100 to more than 1,000 kBtu/ft² across all office buildings, with those at the 95th percentile using almost 7 times the energy of those at the 5th percentile. The distribution has a negative skew, which means the most energy intensive buildings are much further away from the median than the most efficient. Buildings may use more or less energy for many reasons, including variable equipment efficiency and energy management practices, as well as variations in climate and business activities.



The median office building in Portfolio Manager is approximately 70,000 square feet and operates 60 hours per week. But the typical building use patterns observed in Portfolio Manager vary just as much as energy. As you can see, there are offices of all shapes and sizes benchmarking in Portfolio Manager.

Benchmarking by State Number of Office Buildings

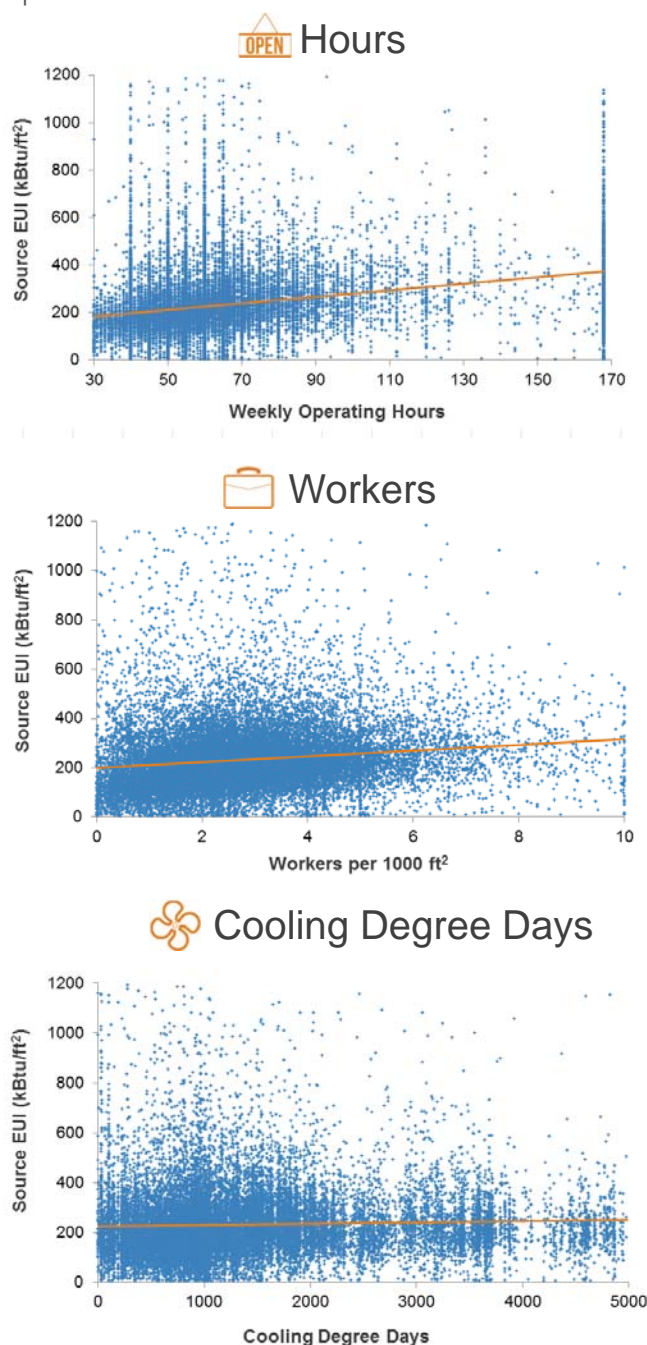


Building Characteristic	Range of Values		
	5th percentile	Median	95th percentile
Square Feet	7,215	69,635	549,681
Operating Hours	40	60	120
Workers per 1000 ft²	0.7	2.4	5.6
Computers per 1000 ft²	0.6	2.5	6.5
Heating Degree Days	965	4,221	6,799
Cooling Degree Days	154	1,114	3,671

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What characteristics affect energy use?

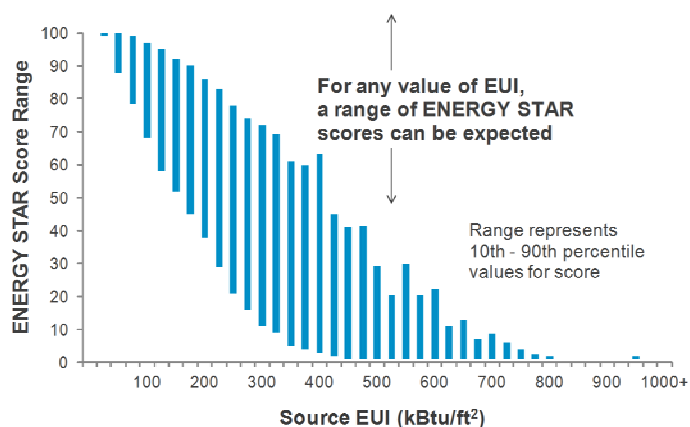
Business activity and climate are often correlated with energy consumption. For example, offices that are open longer hours, have more workers per square foot, and/or experience more cooling degree days (CDD) use more energy, on average. The orange trend line in the graphs below is the steepest for hours, meaning that hours has a stronger effect on energy than CDD or Workers. While these trends hold true on average, two buildings with the same hours could have very different energy, as shown by the range in the blue dots. Similar trends can be seen for other indicators of business activity, such as number of computers.



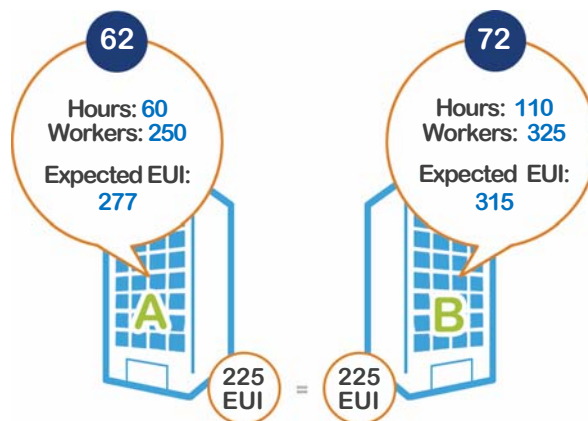
How does EPA's ENERGY STAR score vary with energy use?

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ENERGY STAR Score Range



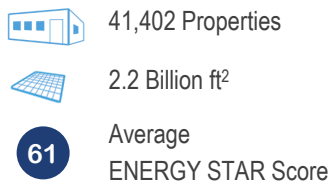
Let's look at two office buildings, Office A and Office B. They have the same EUI of 225 kBtu per square foot, and are identical except that Office B is open longer hours and has more workers per square foot. Because Office B has more intensive activities, it is expected to have a higher EUI than Office A, based on ENERGY STAR scoring models. Since Office B is *expected* to use more energy, but *actually* uses the same energy, it earns a higher score.



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Energy Use in Retail Stores

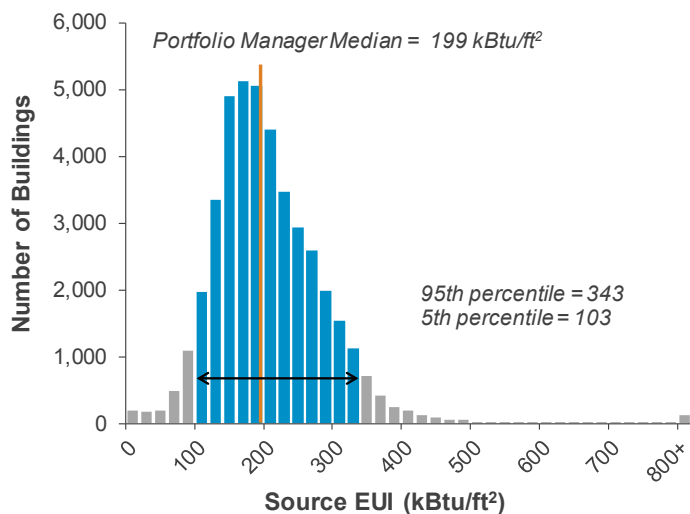
Retail Stores Using Portfolio Manager



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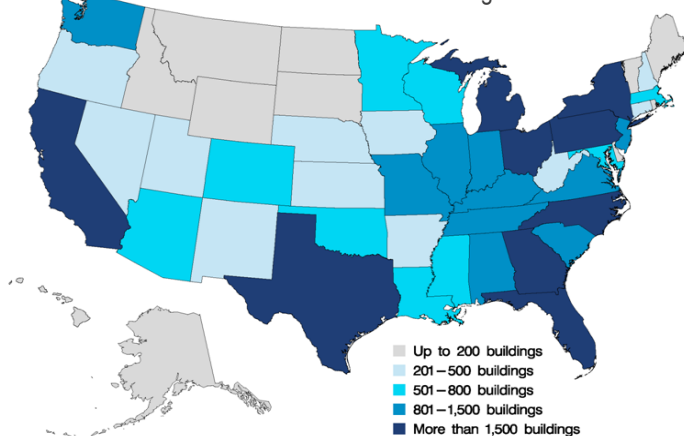
What is a typical operating profile?

Energy use intensity (EUI) ranges from less than 100 to more than 800 kBtu/ft² across all retail buildings, with those at the 95th percentile using more than 3 times the energy of those at the 5th percentile. The distribution has a negative skew, which means the most energy intensive buildings are much further away from the median than the most efficient. Buildings may use more or less energy for many reasons, including variable equipment efficiency and energy management practices, as well as variations in climate and business activities.



The median retail store in Portfolio Manager is approximately 23,000 square feet and operates 91 hours per week. But the typical building use patterns observed in Portfolio Manager vary just as much as energy. As you can see, there are retail stores of all shapes and sizes benchmarking in Portfolio Manager.

Benchmarking by State Number of Retail Buildings

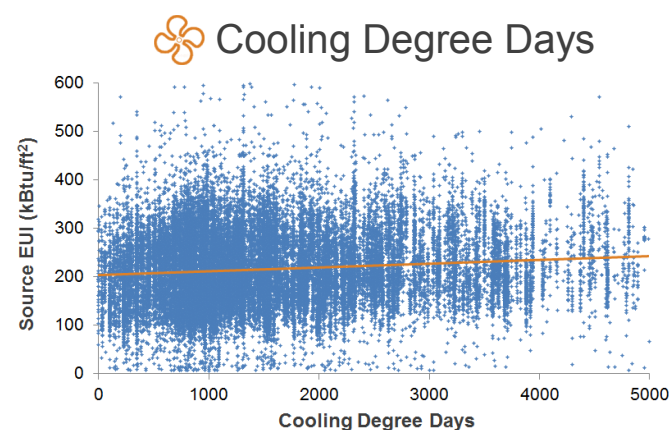
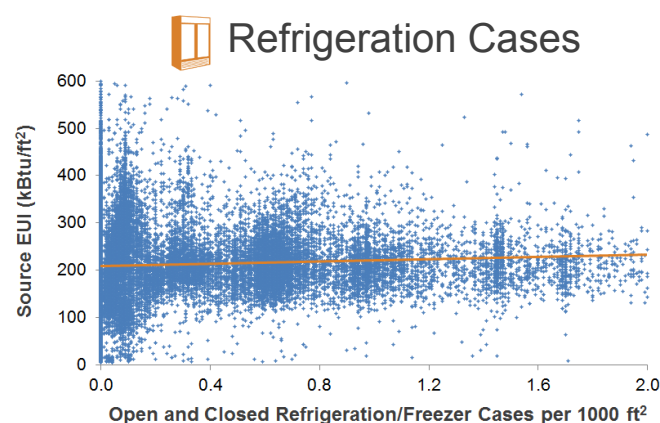
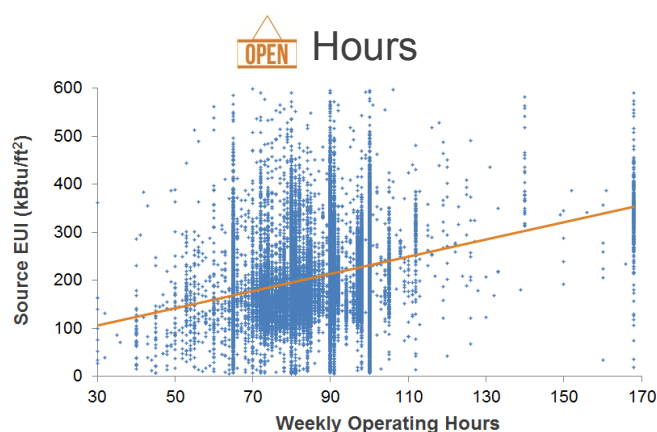


Range of Values			
Building Characteristic	5th percentile	Median	95th percentile
Square Feet	6,500	23,398	161,783
Operating Hours	65	91	100
Workers per 1000 ft ²	0.23	0.55	1.00
Cash Registers per 1000 ft ²	0.16	0.30	0.65
Computers per 1000 ft ²	0.08	0.20	0.88
Walk-in Refrigeration Units per 1000 ft ²	0.00	0.00	0.09
Open/Closed Refrigeration Cases per 1000 ft ²	0.00	0.01	1.02
Heating Degree Days	786	3,844	6,564
Cooling Degree Days	280	1,442	3,689

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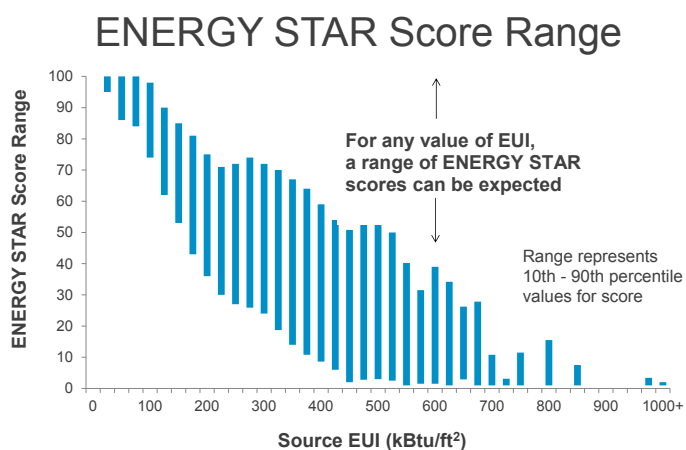
What characteristics affect energy use?

Business activity and climate are often correlated with energy consumption. For example, retail stores that are open longer hours, have more refrigeration/freezer cases per square foot, and/or experience more cooling degree days (CDD) use more energy, on average. The orange trend line in the graphs below is the steepest for hours, meaning hours has a stronger effect on energy than refrigeration cases or CDD. While these trends hold true on average, two buildings with the same hours could have very different energy, as shown by the range in the blue dots. Similar trends can be seen for other indicators of business activity, such as number of workers.

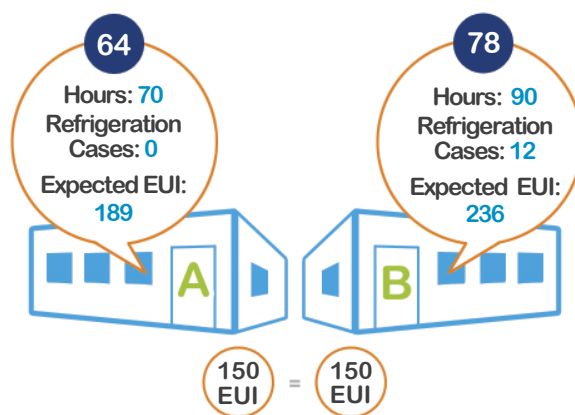


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EPA's ENERGY STAR score normalizes for the effects of operation. While buildings with lower EUI generally earn higher scores on the 1-100 scale, an individual building's result depends on its business activities. For any given EUI, a range of scores is possible.



Let's look at two retail stores, Store A and Store B. They have the same EUI of 150 kBtu per square foot, and are identical except that Store B is open longer hours and has more open/closed refrigeration cases per square foot. Because Store B has more intensive activities, it is expected to have a higher EUI than Store A, based on ENERGY STAR scoring models. Since Store B is *expected* to use more energy, but *actually* uses the same energy, it earns a higher score.



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Energy Use in Retail Stores

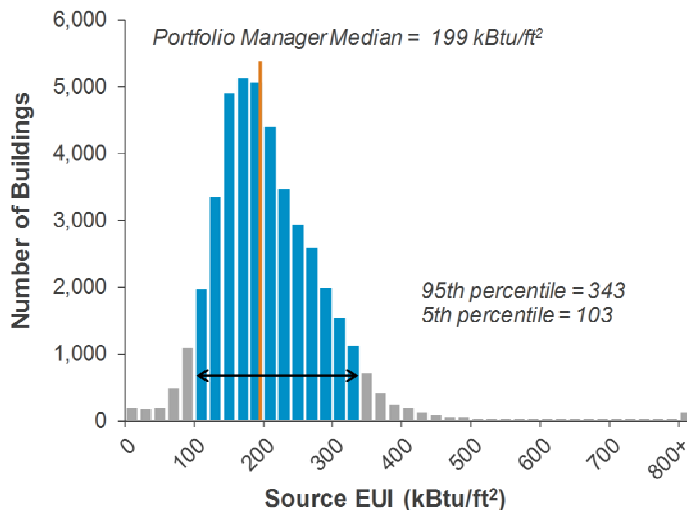
Retail Stores Using Portfolio Manager



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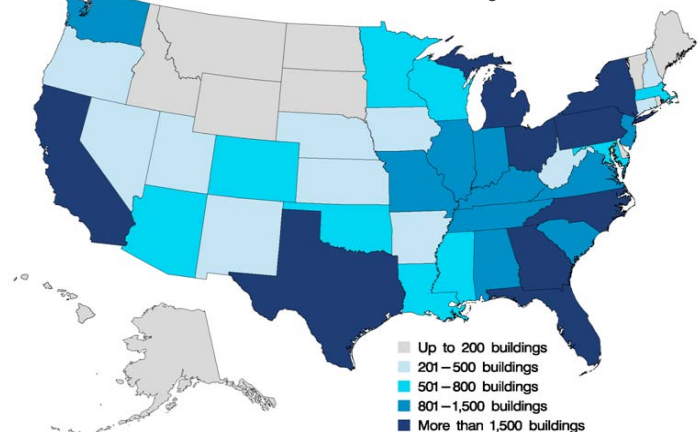
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Energy use intensity (EUI) ranges from less than 100 to more than 800 kBtu/ft² across all retail buildings, with those at the 95th percentile using more than 3 times the energy of those at the 5th percentile. The distribution has a negative skew, which means the most energy intensive buildings are much further away from the median than the most efficient. Buildings may use more or less energy for many reasons, including variable equipment efficiency and energy management practices, as well as variations in climate and business activities.



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Benchmarking by State Number of Retail Buildings

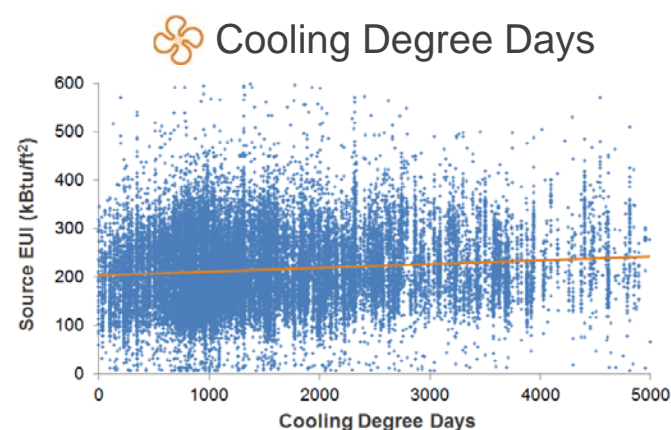
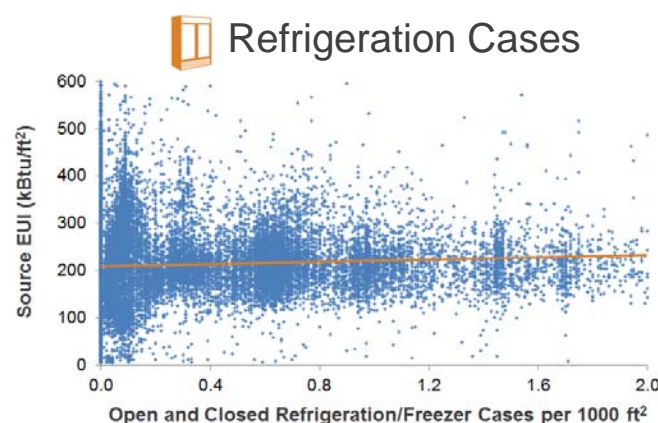
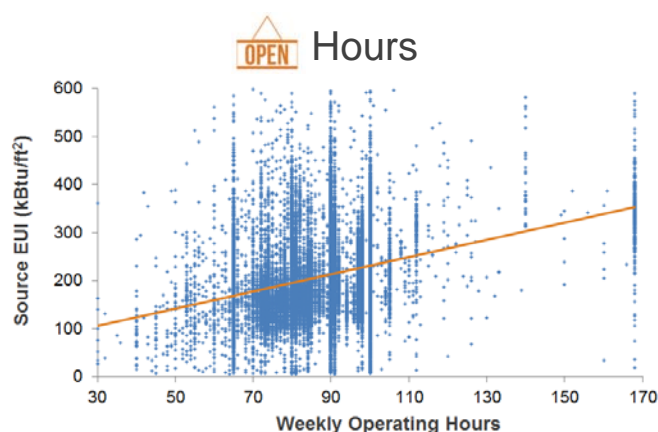


Range of Values			
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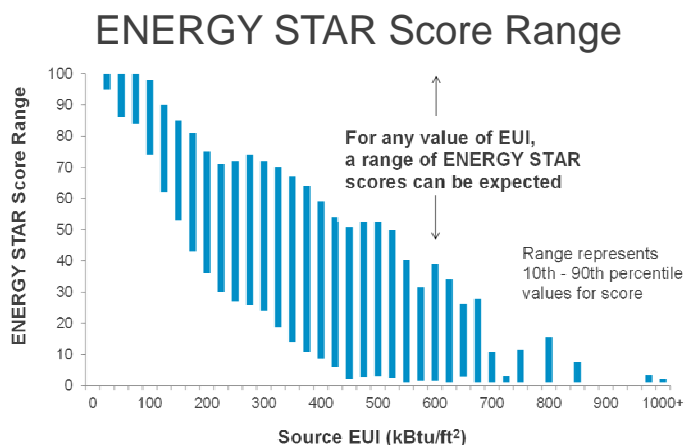
What characteristics affect energy use?

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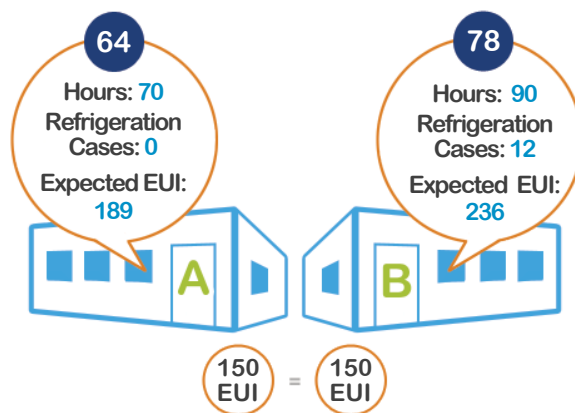


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Let's look at two retail stores, Store A and Store B. They have the same EUI of 150 kBtu per square foot, and are identical except that Store B is open longer hours and has more open/closed refrigeration cases per square foot. Because Store B has more intensive activities, it is expected to have a higher EUI than Store A, based on ENERGY STAR scoring models. Since Store B is *expected* to use more energy, but *actually* uses the same energy, it earns a higher score.




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Energy Use in K-12 Schools

K-12 Schools Using Portfolio Manager

 51,500 Properties

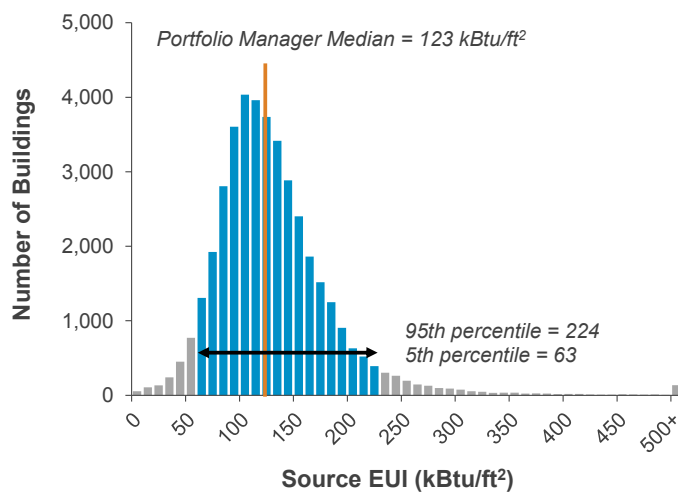
 5.4 Billion ft²

 64 Average
ENERGY STAR Score

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What is a typical operating profile?

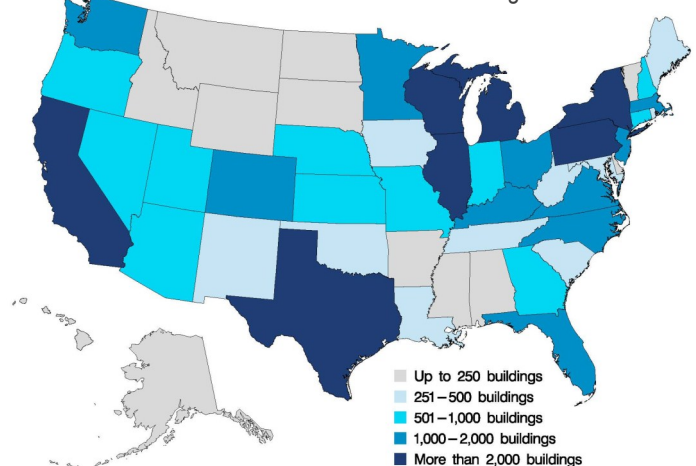
Energy use intensity (EUI) ranges from less than 50 to more than 500 kBtu/ft² across all K-12 School buildings, with those at the 95th percentile using almost 4 times the energy of those at the 5th percentile. The distribution has a negative skew, which means the most energy intensive buildings are much further away from the median than the most efficient. Buildings may use more or less energy for many reasons, including variable equipment efficiency and energy management practices, as well as variations in climate and building activities.











The median K-12 School building in Portfolio Manager is approximately 75,000 square feet and has just over 2 computers per thousand square feet. But the typical building use patterns observed in Portfolio Manager vary just as much as energy. As you can see, there are K-12 Schools of all shapes and sizes benchmarking in Portfolio Manager.

Benchmarking by State

Number of K-12 School Buildings



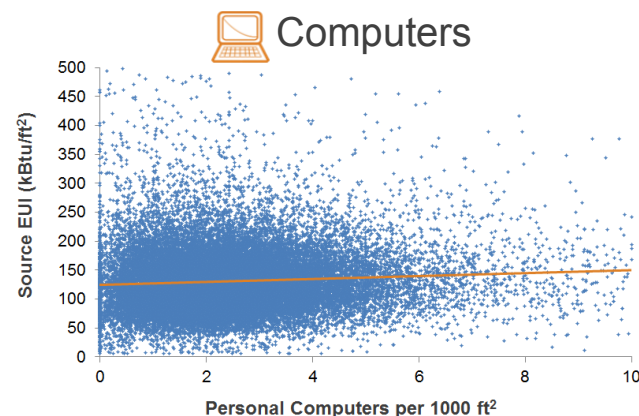
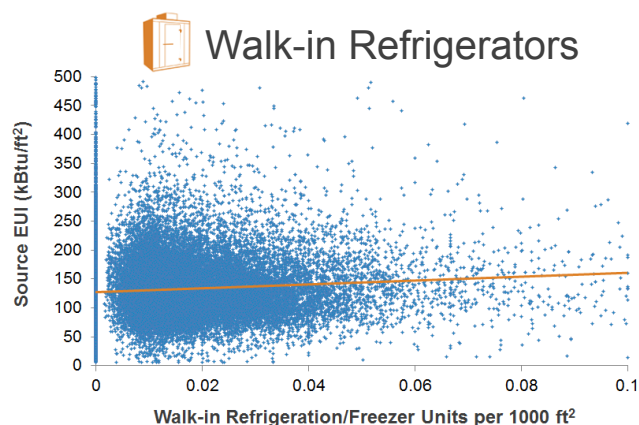
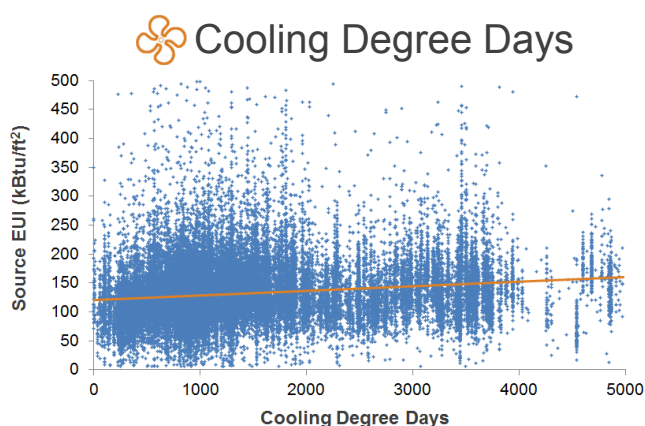
Range of Values

Building Characteristic	5th percentile	Median	95th percentile
 Square Feet	22,912	74,671	282,507
 Computers per 1000 ft ²	0.57	2.11	4.99
 Walk-in Refrigeration Units per 1000 ft ²	0.00	0.01	0.04
 Cooking?	--	80% say yes	--
 Open Weekends?	--	24% say yes	--
 High School?	--	18% say yes	--
 Heating Degree Days	971	4,627	7,035
 Cooling Degree Days	262	1,152	3,595

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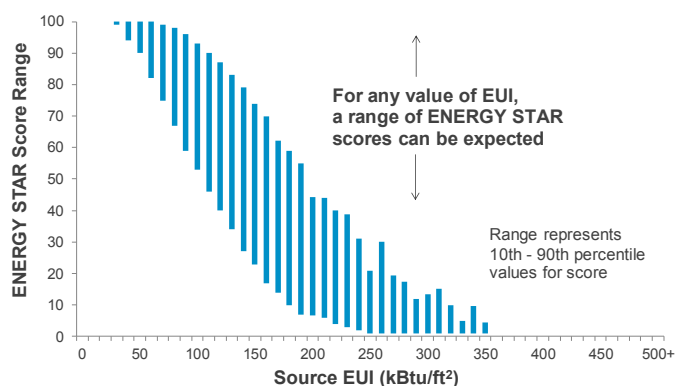
Building activity and climate are often correlated with energy consumption. For example, schools that experience more cooling degree days (CDD), have more walk-in refrigerators (a measure of cafeteria activity), or more computers per square foot use more energy, on average. The orange trend line in the graphs below is the steepest for CDD, meaning CDD has a stronger effect on energy than refrigerators or computers. While these trends hold true on average, two buildings with the same CDD could have very different energy, as shown by the range in the blue dots. Similar trends can be seen for other indicators of building activity. For example, energy use is higher for high schools than elementary schools.



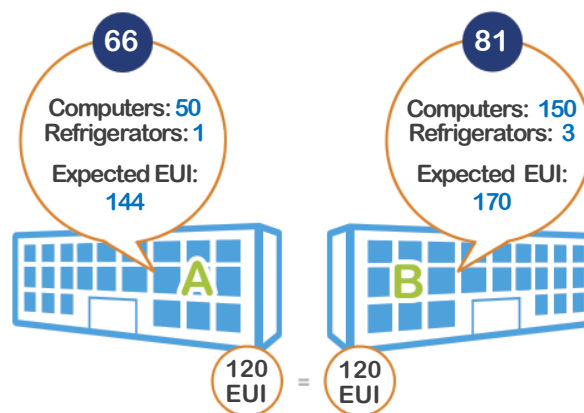
How does EPA's ENERGY STAR score vary with energy use?

EPA's ENERGY STAR score normalizes for the effects of operation. While buildings with lower EUI generally earn higher scores on the 1-100 scale, an individual building's result depends on its activities. For any given EUI, a range of scores is possible.

ENERGY STAR Score Range



Let's look at two K-12 School buildings, School A and School B. They have the same EUI of 120 kBtu per square foot, and are identical except that School B has more computers and walk-in refrigeration units per square foot. Because School B has more intensive activities, it is expected to have a higher EUI than School A, based on ENERGY STAR scoring models. Since School B is *expected* to use more energy, but *actually* uses the same energy, it earns a higher score.




Note: Number and floor area of buildings benchmarked includes cumulative data through 2011. Analysis of energy use and building activity includes buildings benchmarked between 2006 and 2012. The data is self reported and has been filtered to exclude outliers, incomplete records, and test facilities. Portfolio Manager is not a randomly selected sample and is not the basis of the ENERGY STAR score. To learn more, visit: www.energystar.gov/DataTrends.

Energy Use in K-12 Schools

K-12 Schools Using Portfolio Manager

 51,500 Properties

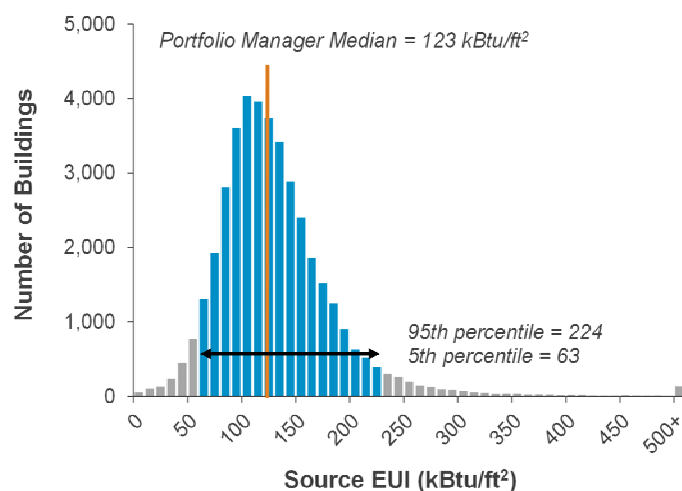
 5.4 Billion ft²

 64 Average
ENERGY STAR Score

The U.S. Environmental Protection Agency's (EPA) ENERGY STAR Portfolio Manager is changing the way organizations track and manage energy. Because of this widespread market adoption, EPA has prepared the DataTrends series to examine benchmarking and trends in energy and water consumption in Portfolio Manager. To learn more, visit www.energystar.gov/DataTrends.

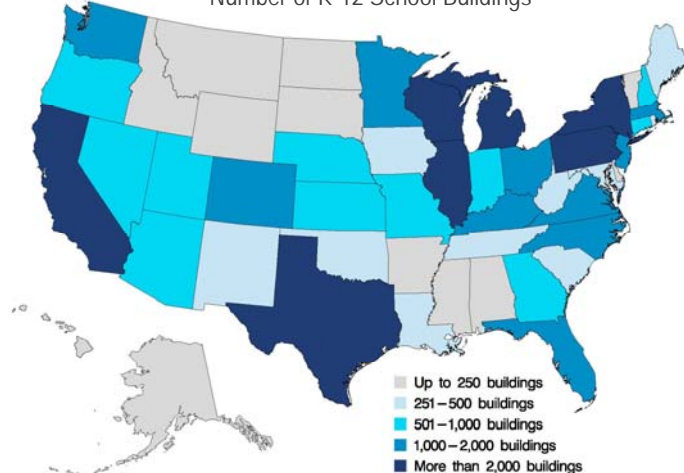
What is a typical operating profile?

Energy use intensity (EUI) ranges from less than 50 to more than 500 kBtu/ft² across all K-12 School buildings, with those at the 95th percentile using almost 4 times the energy of those at the 5th percentile. The distribution has a negative skew, which means the most energy intensive buildings are much further away from the median than the most efficient. Buildings may use more or less energy for many reasons, including variable equipment efficiency and energy management practices, as well as variations in climate and building activities.











The median K-12 School building in Portfolio Manager is approximately 75,000 square feet and has just over 2 computers per thousand square feet. But the typical building use patterns observed in Portfolio Manager vary just as much as energy. As you can see, there are K-12 Schools of all shapes and sizes benchmarking in Portfolio Manager.

Benchmarking by State Number of K-12 School Buildings



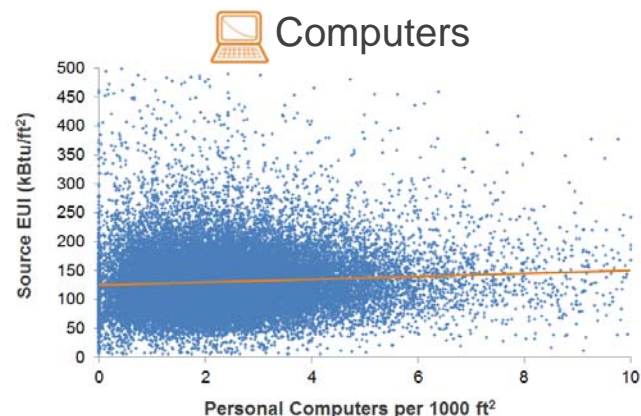
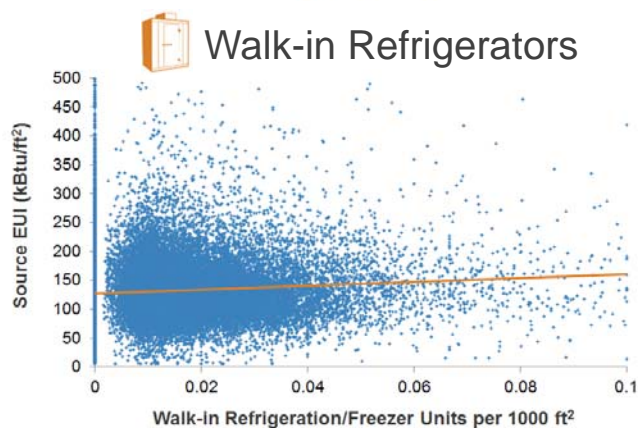
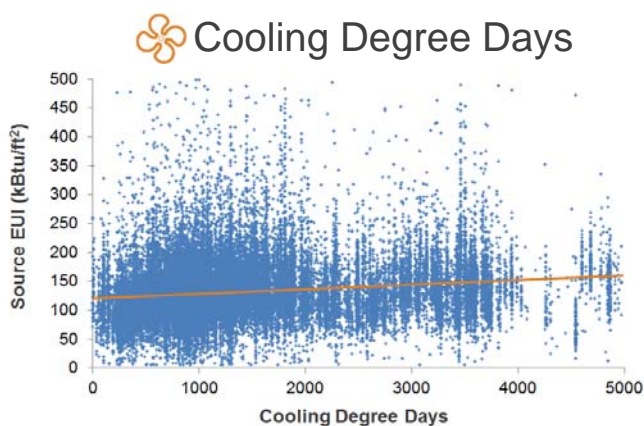
Range of Values

Building Characteristic	5th percentile	Median	95th percentile
 Square Feet	22,912	74,671	282,507
 Computers per 1000 ft ²	0.57	2.11	4.99
 Walk-in Refrigeration Units per 1000 ft ²	0.00	0.01	0.04
 Cooking?	--	80% say yes	--
 Open Weekends?	--	24% say yes	--
 High School?	--	18% say yes	--
 Heating Degree Days	971	4,627	7,035
 Cooling Degree Days	262	1,152	3,595

What is Source Energy? Source energy is the amount of raw fuel required to operate your building. In addition to what you use on-site, source energy includes losses from generation, transmission, and distribution of energy. Source energy enables the most complete and equitable energy assessment. Learn more at: www.energystar.gov/SourceEnergy.

What characteristics affect energy use?

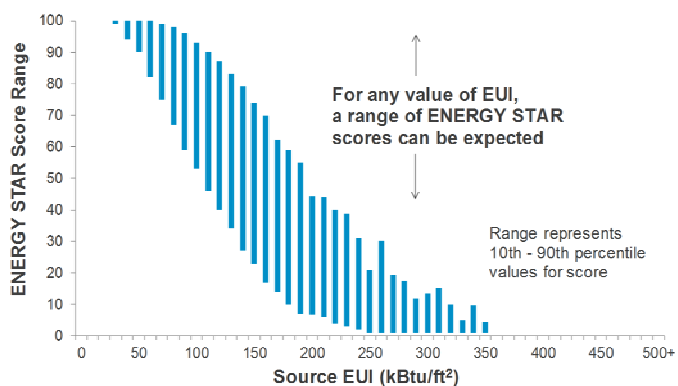
Building activity and climate are often correlated with energy consumption. For example, schools that experience more cooling degree days (CDD), have more walk-in refrigerators (a measure of cafeteria activity), or more computers per square foot use more energy, on average. The orange trend line in the graphs below is the steepest for CDD, meaning CDD has a stronger effect on energy than refrigerators or computers. While these trends hold true on average, two buildings with the same CDD could have very different energy, as shown by the range in the blue dots. Similar trends can be seen for other indicators of building activity. For example, energy use is higher for high schools than elementary schools.



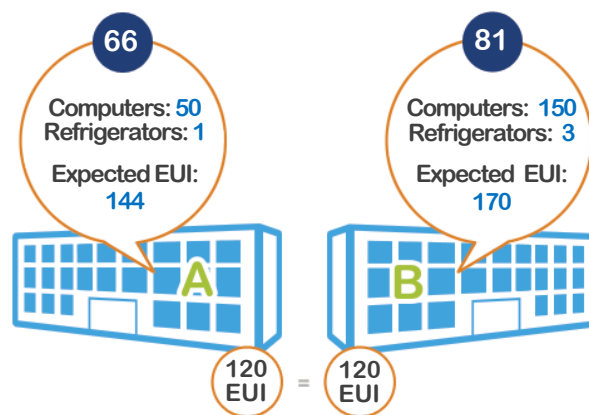
How does EPA's ENERGY STAR score vary with energy use?

EPA's ENERGY STAR score normalizes for the effects of operation. While buildings with lower EUI generally earn higher scores on the 1-100 scale, an individual building's result depends on its activities. For any given EUI, a range of scores is possible.

ENERGY STAR Score Range



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energystar.gov

ENERGY STAR® is a U.S. Environmental Protection Agency program helping businesses and individuals fight global warming through superior energy efficiency.

ENERGY STAR Hotel Benchmarking Activity July 2010

EPA's ENERGY STAR energy performance scale evaluates actual, as-billed energy data to create a whole building indicator of energy performance and compare a building to its national peer group. EPA analyzes national survey data, develops regression models to predict energy use based on operation, and assigns a 1-to-100 score to a building. Each point on the scale represents one percentile of buildings. A full overview of this process and specific details on the hotel methodology are available online.¹ The purpose of this document is to provide an overview of benchmarking activity within Portfolio Manager.

Overview

The number of Hotels benchmarking has increased dramatically in recent years, with a 34% increase between 2008 and 2009. As of June 2010, there are over 5,000 Hotels receiving EPA ENERGY STAR scores in Portfolio Manager. The following table summarizes basic characteristics of hotels in Portfolio Manager: the average score is just below 50 and nearly 1,000 buildings score 75 or higher. These scores are evenly distributed along the 1-to-100 scale, which would be expected.

Portfolio Manager Hotel Benchmarking Characteristics	
All Hotels	5,262
Total Square Foot	1,041,153,574
Average Score	47
Number Scoring 75 or Higher	995

Fast Facts

The 5,262 hotels in Portfolio Manager represent a broad cross-section of the hospitality industry. They are large and small hotels located across the country. Some quick facts include:

- There are hotels located in all 50 states, the District of Columbia, Puerto Rico, and Guam.
 - All 48 states/territories that have 10 or more hotels benchmarking have at least one that scores 75 or higher.
 - California has the most hotels, with over 700 benchmarking.
- Hotel sizes range from 5,000 square foot to over 2,000,000 square foot:
 - The average hotel size is approximately 200,000 square foot.
- The number of rooms found in hotels ranges from 10 to over 1,000
 - The average is approximately 250 rooms.
- Approximately 60% of hotels report commercial cooking.
- Approximately 9% of hotels report swimming pools.
- The 995 Hotels with scores of 75 or higher have similar characteristics to the full set of hotels, on average
 - Sizes range from 5,000 to over 2,000,000
 - Number of rooms ranges from 10 to over 1,000

¹ http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager_model_tech_desc.

Filters Applied for Portfolio Manager Data Analysis

DRAFT

Data from Portfolio Manager may be used by EPA for a number of reasons, including the following:

1. Verifying model performance during model development
2. Analyzing score changes prior to the release of a new model
3. Reviewing model performance to consider model updates; and
4. Assessing model performance to share results with stakeholders.

Because of the large number of buildings in Portfolio Manager, the data is extremely valuable for developing a greater understanding of energy consumption in commercial buildings. However, when analyzing data from Portfolio Manager, it is important to remember that it is entered voluntarily. There are no checks in place to ensure that all data is complete and accurate. In order to eliminate as much incorrect data as possible, EPA can apply a set of filters to eliminate buildings with energy use and operating characteristics that fall outside of a normal range.

First, filters can be applied to identify the set of buildings to be analyzed.¹ These may include one or more of the filters in Table 1, depending on the analysis being conducted.

Table 1 Filters to Select a Set of Buildings	
Condition for Including a Record in the Analysis	Comments
Building Type includes a "BUILDING TYPE"	Selects buildings that include at least one space of a given building type.
Building Type = "BUILDING TYPE"	Selects buildings where 50% or more of the gross floor area is a given building type.
Building Receives a Rating	May be used to limit analysis to buildings that receive a rating.
Number of Primary Spaces = 1	May be used to limit analysis to very simple buildings with only one primary space.
Parking Gross Floor Area = 0	May be used to limit analysis to buildings with no parking space.
Data Center Gross Floor Area = 0	May be used to limit analysis to buildings with no data center space.
Other Gross Floor Area = 0	May be used to limit analysis to buildings with no Other space.
Pool Size = Blank	May be used to limit analysis to buildings with no swimming pool space.

¹ These are applied after initial filters to remove test buildings, or buildings owned by EPA or its contractors.

Period Ending Date > “XX/XX/XXXX”	May be used to limit analysis to buildings with recent data.
Last Updated > “XX/XX/XXXX”	May be used to limit analysis to buildings that were updated recently.
No Default Values	May be used to limit analysis to buildings that have entered actual operating characteristics.

Next, filters can be applied to ensure that programmatic requirements are met. These are typically the same as the EPA Program Filters applied during model development. These filters should not be necessary if the data is also filtered for buildings that receive a rating, since buildings should not receive a rating if these conditions are not met.

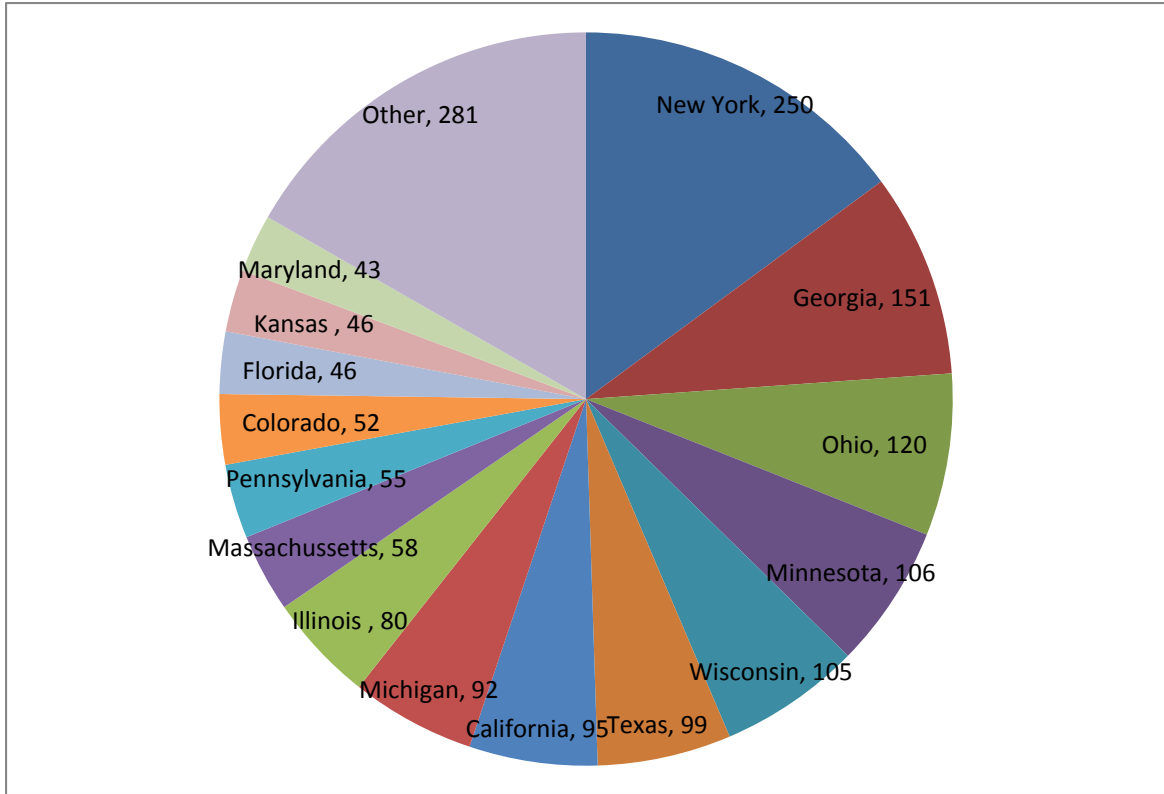
Table 2 EPA Program Filters	
Condition for Including a Record in the Analysis	Space Types for which Filters Apply
Floor Area >= 5,000 sq. ft.	All except Bank and Worship
Floor Area >=1,000 sq. ft.	Bank, Worship
Work Hours >= 30	Office, Medical Office, Retail, Supermarket

Finally, additional filters can be applied to exclude buildings with energy use and operating characteristics that fall outside a normal range. These filters are different than the analytical filters used during model development, and are set so that only the most extreme data is removed. The intent is to remove data that has been entered incorrectly, or that doesn't represent real buildings. Some of these filters can be applied across all space types, and others are specific to certain space types, depending upon the variables included in the models and the expected ranges for specific space types. These filters are included in Table 3.

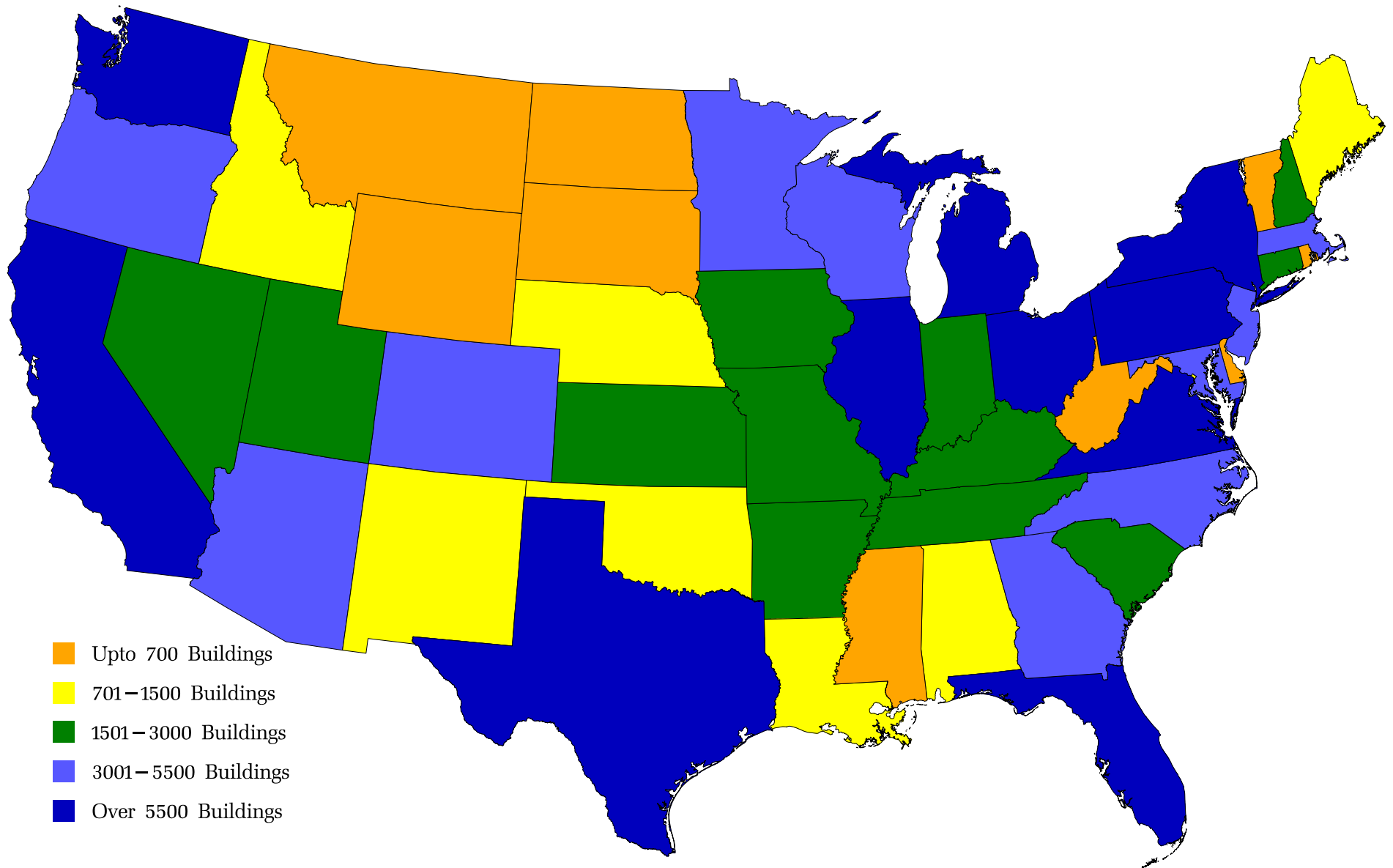
Table 3 Filters to Exclude Extreme Data	
Condition for Including a Record in the Analysis	Space Types for which Filters Apply
Floor Area <= 5,000,000 sq. ft.	All
5 <= EUI <= 2000	All
Worker Density <= 20	Office, Medical Office
Worker Density <= 5	Retail, Supermarket, Warehouse
PC Density <= 20	Office, Worship, K-12 School, Retail
CommRfgDen <= 2	Hotel, Worship
WalkinDen <= 1?	K-12 School, Supermarket, Retail
Open & Closed Density <= ?	Retail
0.4 <= Room Density <= 5 (2500 >= SqFt/Room >= 200)	Hotel
Bed Density <= ?	Hospital

Seating Density \leq ?	House of Worship
Room Density \leq ?	Dormitory

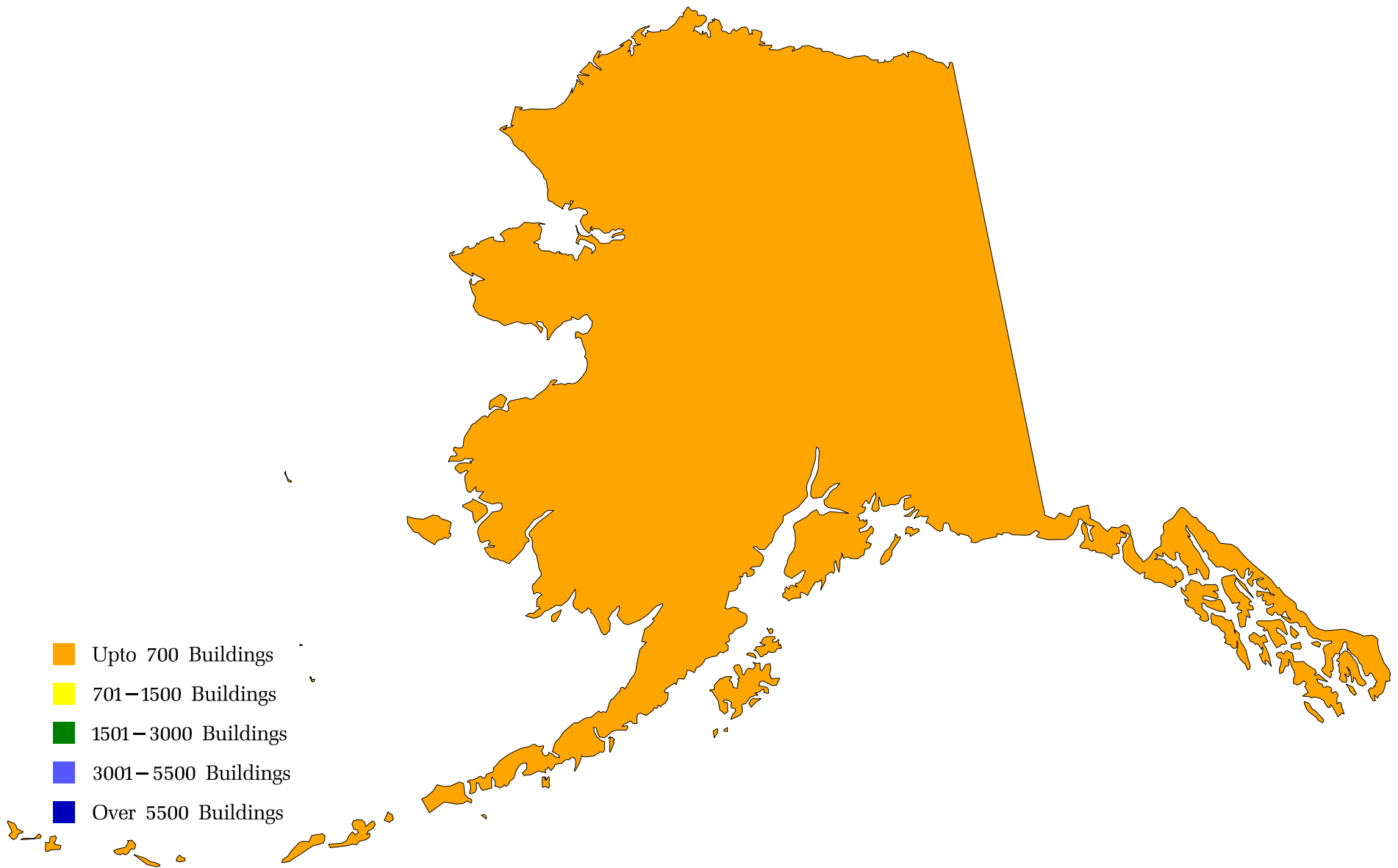
Geography by State	
Total # of states W >= 1 house of worship	45
HIGHEST	New York
LOWEST	Alaska, North Dakota, South Dakota, Rhode Island, Wyoming



Benchmarked Buildings by State



Benchmarked Buildings by State



Benchmarked Buildings by State



...of those of the entire United States, which he calls "one scary statistic."

It is easy to decry the problem but far harder to know what to do, especially in a warming world where people in the United States are using our existing air-conditioners more often. The number of cooling degree days — a measure of how often cooling is needed — was 17 percent above normal in the United States in 2010, according to the Environmental Protection Agency, leading to "an increase in electricity demand." This July was the hottest ever in the United States.

Likewise, the blackouts in India were almost certainly related to the rising use of air-conditioning and cooling, experts say, even if the immediate culprit was a grid that did not properly balance supply and demand.

The late arrival of this year's monsoons, which normally put an end to India's hottest season, may have devastated the incomes of farmers who needed the rain. But it "put smiles on the faces of those who sell white goods — like air-conditioners and refrigerators — because it meant lots more sales," said Rajendra Shende, chairman of the Terre Policy Center in Pune, India.

"Cooling is the craze in India — everyone loves cool temperatures and getting to cool temperatures as quickly as possible," Mr. Shende said. He said that cooling has become such a cultural priority that rather than advertise a car's acceleration, salesmen in India now emphasize how fast its air-conditioner can cool.

Scientists are scrambling to invent more efficient air-conditioners and better coolant gases to minimize electricity use and emissions. But so far the improvements have been dwarfed by humanity's rising demands.

And recent efforts to curb the use of air-conditioning, by fiat or persuasion, have produced sobering lessons.

Since 2005, Japan had been promoting energy conservation through its annual summer "cool biz" campaign: air-conditioning thermostats in government offices were set to between 75 and 77 degrees and workers were told they could forsake business suits for looser, cooler clothes. So far so good.

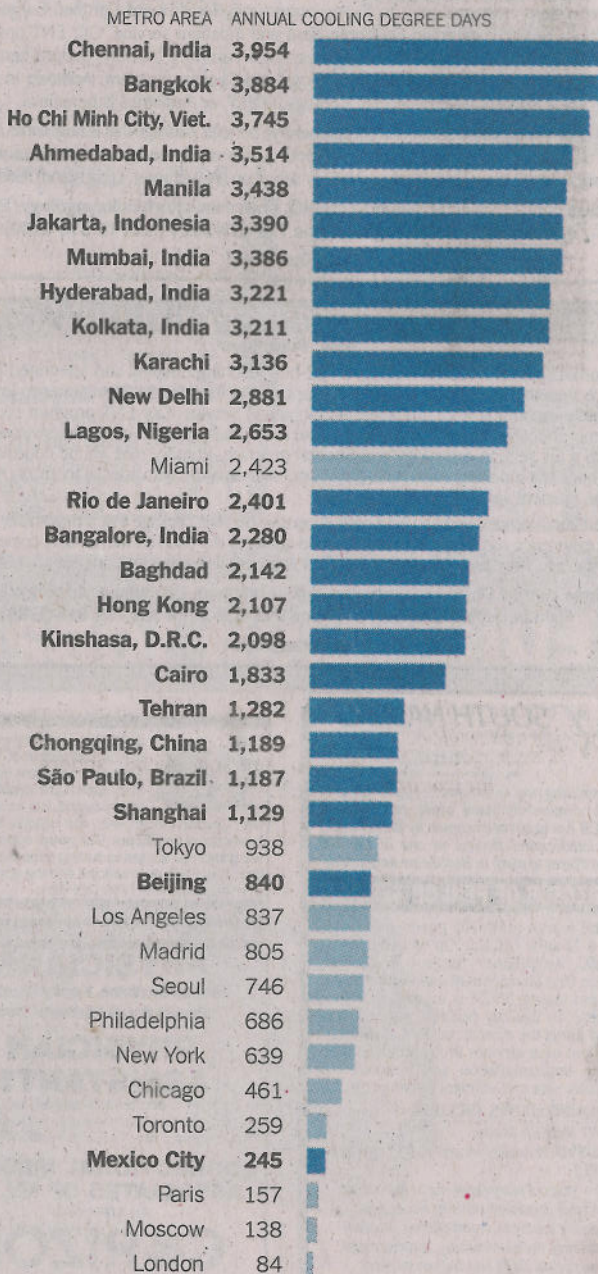
But in the past year, the country became an unwitting laboratory to study even more extreme air-conditioning abstinence, and the results have not been encouraging. After the Fukushima earthquake and tsunami knocked out a big chunk of the country's nuclear power, the Japanese government mandated vastly reduced energy consumption. To that end, lights have been dimmed and air-conditioners turned down or off, so that offices comply with the government-prescribed indoor summer temperature of 82.4 degrees (28 Celsius); some offices have tried as high as 86.

Unfortunately, studies by Shin-ichi Tanabe, a professor of architecture at Waseda University in Tokyo who has long been interested in "thermal comfort" found that while workers

conditions.

Mr. Wargocki says that an office temperature in the mid to high 70s should be fine. The comfortable temperature for sleeping (naked) is around 84, Mr.

CRANK IT UP Cooling degree days — an oddly named index that measures (but not in actual days) the need for air-conditioning — in large urban areas. Developing regions are in **bold**.



Source: Michael Sivak, University of Michigan.

THE NEW YORK TIMES

Tanabe says, if a fan is on.

Those suggestions are a good deal warmer than the norms in the United States, which underlines a cultural differences in cooling preferences.

"The temperature many Americans find most comfortable indoors in summer

— 70 degrees — feels uncomfortable

